

Educational Approaches in Conservation between Europe and North Africa: A Comparative Study of Teaching Methods and Cultural Perspectives.

Dissertation
zur Erlangung des Grades
der Doktorin der Philosophie (Dr.phil)
an der Fakultät für Geisteswissenschaften,
der Universität Hamburg

vorgelegt von
Marlen Börngen, M.A.
aus Dresden

Hamburg, 2025

Erstgutachter: Prof. Dr. Oliver Hahn

Zweitgutachter: Prof. Dr. Andrea Pataki-Hundt

Weitere Kommissionsmitglieder: Prof. Dr. Kaja Harter-Uibopuu

Datum der mündlichen Prüfung: 19.01.2026

Eidesstattliche Erklärung

Ich versichere an Eides statt durch meine eigene Unterschrift, dass ich die vorliegende Dissertation selbstständig und ohne fremde Hilfe angefertigt und alle Inhalte (Text, Bild, Ton, Video und Daten anderer Art), die identisch oder annähernd identisch aus bestehenden Quellen übernommen wurden, als solche kenntlich gemacht und dass ich mich auch keiner anderen als der angegebenen Quellen und Hilfsmittel bedient habe.

Sofern im Zuge der Erstellung der vorliegenden Dissertationsschrift generative Künstliche Intelligenz (gKI) basierte elektronische Hilfsmittel verwendet wurden, versichere ich, dass meine eigene Leistung im Vordergrund stand und dass eine vollständige Dokumentation aller verwendeten Hilfsmittel gemäß der Guten wissenschaftlichen Praxis vorliegt. Ich trage die Verantwortung für eventuell durch die gKI generierte fehlerhafte oder verzerrte Inhalte, fehlerhafte Referenzen, Verstöße gegen das Datenschutz- und Urheberrecht oder Plagiate. Ich versichere, diese Arbeit nicht bereits in einem anderen Promotionsverfahren eingereicht zu haben. Ich versichere die inhaltliche und formale Gleichheit der eingereichten Print- und Digitalexemplar.

Köln, im Mai 2025

Marlen Börngen

Technical support tools:

In this dissertation, automated translation assistance was provided by DeepL (www.deepl.com), a neural machine translation service, to support the translation process. All translations were carefully reviewed, edited, and validated to ensure accuracy and academic integrity.

Several figures were created using Canva (www.canva.com), a web-based graphic design platform. All visual elements were carefully designed, edited, and customised to meet academic standards and effectively communicate the research findings.

“[...] conservation is an activity that has been inherent to most, if not all, cultures from all ages.” (Muñoz Viñas, 2020, p. 1)

Acknowledgements

I express my sincere gratitude to my doctoral supervisor, Professor Dr Oliver Hahn, for his guidance and the trust he placed in me throughout the entire doctoral process. I am particularly indebted to Professor Dr Andrea Pataki-Hundt, who opened the door to this PhD journey and supported my application for the Mathilde-von-Mevissen Fellowship. Her expertise and continuous feedback have been instrumental in shaping my academic path.

I extend my gratitude to Professor Dr Klaus Becker, former Vice President of TH Köln and patron of the Mathilde-von-Mevissen Fellowships and the Graduate Centre of the University of Applied Sciences Cologne (TH Köln), particularly Mirijam Heetkamp and Dr Katharina Rohrbach, for their excellent organisational support. The accompanying coaching programme with Dr Antje Schultheis and fellow doctoral candidates proved invaluable in helping me navigate the challenging phases of the doctorate. Recognising that all doctoral students face similar obstacles has been a huge help in coping.

I am deeply grateful to the CSMC, especially Professor i.R. Dr Michael Friedrich, former spokesperson of the CSMC, and Professor Dr Kaja Harter-Uibopuu, Co-Spokesperson at the Cluster of Excellence “Understanding Written Artefacts” (UWA), as well as Dr Doreen Schröter (Coordinator Cultural Heritage) and Dr Meryl Rebello (Coordinator Graduate School), for their support throughout the process and for helping me find my place as an external candidate. I would like to thank the staff at KMP, especially Professor Dr Asma Hilali and Davidson MacLaren, and the conservators at NLPCPM in Tunisia, particularly the interns.

To my companions from the “Elfenbeinturm” – Peter Konarzewski, Josefine Werthmann, Maike Schmidt, and Marie-Louise Frank – thank you for the understanding ears during both challenging and triumphant moments. My heartfelt thanks go to Bert Jacek and Dr Doris Oltrogge, not only for their professional expertise but also for creating sometimes the necessary space for me to focus on my research. I would like to express my gratitude to the CICS students who participated in the surveys, as their contributions were invaluable to this research. I would also like to thank Dr Schwartz for sharing his valuable insights about the Kairouan-Göttingen Project. My thanks also go to Professor Dr Jane Henderson and Amy Crossman for answering my questions about their courses in Kairouan. I am particularly grateful to my mother for her constant support and, above all, to my partner Patrick. His loving encouragement and understanding have been my anchor throughout this intensive period.

Abbreviations

ABL	Activity Based Learning
AIC	American Institute of Conservation
AL	Active Learning
ASEAN	Association of South East Asian Nations
BL	Blended Learning
BPBL	Blended Problem-based learning
BSL	Bize-sized Learning
CICS	Cologne Institute of Conservation Sciences
CSMC	Centre for the Study of Manuscript Cultures
E.C.C.O.	European Confederation of Conservator-Restorers Organisations
EL	Experiential learning
ENCoRE	European Network for Conservation-Restoration Education
EQF	European Qualification Framework
GDP	Gross Domestic Product
GNI	Gross National Income
HDI	Human Development Index
HEP	Hochschulentwicklungsplan
HIC	high-income countries
IADA	International Association of Book and Paper Conservation
ICCROM	International Centre for the Study of the Preservation and Restoration of Cultural Property
ICOM-CC	International Council of Museums - Committee for Conservation
ICOMOS	International Council of Monuments and Sites
ICON	Institute of Conservation
INP	Institut national du patrimoine/Tunisian Institut National du Patrimoine
KMP	Kairouan Manuscript Project
LCI	low-income countries
MENA	Middle East and North Africa
MIC	middle-income countries
MOOCs	massive open online courses
NHI	National Heritage Institute

NLPCPM	National Laboratory for the Preservation and Conservation of Parchment and Manuscripts
OER	open educational resources
PBL	Problem-Based Learning
SAMR	Substitution, Augmentation, Modification and Redefinition
TH Köln	Technische Hochschule Köln, University of Applied Sciences Cologne
UNESCO	United Nations Educational, Scientific and Cultural Organisation
e-learning	electronic learning

Table of Content

Acknowledgements	I
Abbreviations	II
1 Introduction.....	1
1.1 <i>Scope of the Study – Significance</i>	<i>1</i>
1.2 <i>Research Methodology.....</i>	<i>3</i>
1.3 <i>Challenges in relation to the research method</i>	<i>4</i>
2 Education in Conservation.....	8
2.1 <i>Ethical standards and training programmes in conservation practice</i>	<i>8</i>
2.2 <i>Global conservation education</i>	<i>14</i>
2.2.1 <i>Insights into conservation education.....</i>	<i>17</i>
2.2.2 <i>Cultural heritage conservation education in post-conflict or post-disaster zones...</i>	<i>23</i>
2.2.3 <i>Empowering Conservation: Education Initiatives in Emerging Countries - a few examples</i>	<i>26</i>
2.2.4 <i>Communities and Conservation.....</i>	<i>34</i>
2.2.5 <i>Conclusion</i>	<i>36</i>
2.3 <i>Integrating innovative approaches in cultural heritage conservation education.....</i>	<i>37</i>
3 Didactic theory and use in conservation education	42
3.1 <i>General Terms of Learning.....</i>	<i>42</i>
3.2 <i>Learning Theories</i>	<i>44</i>
3.2.1 <i>Behaviourism</i>	<i>46</i>
3.2.2 <i>Cognitivism.....</i>	<i>47</i>
3.2.3 <i>Constructivism</i>	<i>48</i>
3.2.4 <i>Connectivism</i>	<i>49</i>
3.2.5 <i>Conclusion in the context of conservation.....</i>	<i>49</i>
3.3 <i>Didactic Concepts.....</i>	<i>51</i>
3.3.1 <i>Blooms Digital Taxonomy.....</i>	<i>51</i>
3.3.2 <i>The SAMR Model.....</i>	<i>54</i>
3.3.3 <i>Application example of Bloom’s Digital Taxonomy and SAMR model</i>	<i>55</i>
3.4 <i>John Hattie’s meta-analysis.....</i>	<i>58</i>
3.4.1 <i>Introduction.....</i>	<i>58</i>
3.4.2 <i>The meta-analysis at universities</i>	<i>63</i>
3.5 <i>Modern Teaching and Learning methods in the 21st century</i>	<i>64</i>
3.5.1 <i>Active Learning (AL)</i>	<i>65</i>
3.5.2 <i>Activity Based Learning (ABL).....</i>	<i>67</i>
3.5.3 <i>Bite-sized Learning (BSL).....</i>	<i>68</i>
3.5.4 <i>Blended Learning (BL)</i>	<i>69</i>
3.5.5 <i>E-learning.....</i>	<i>71</i>
3.5.6 <i>Experiential Learning (EL)</i>	<i>72</i>
3.5.7 <i>Flipped Classroom, Flipped Lab.....</i>	<i>73</i>
3.5.8 <i>Lifelong Learning</i>	<i>74</i>

3.5.9 Open Educational Resources (OER).....	75
3.5.10 Problem Based Learning (PBL).....	76
4 The “Jigsaw Teaching Project” – Video Tutorials in Paper Conservation Education	78
4.1 <i>Data Collection and Implementation</i>	80
4.1.1 Initial survey among the conservation students	81
4.1.2 Content Designing Phase	93
4.1.3 Content Creation Phase.....	96
4.1.4 Research Findings: Analysis of Student Learning Experiences	99
4.2 <i>Metrics of the YouTube channel “Papier Restaurierung”</i>	110
4.3 <i>Conclusion</i>	111
5 Research subject.....	117
5.1 <i>Cologne Institute of Conservation Sciences – Germany a European example</i>	117
5.1.1 Concepts of digital teaching at TH Köln	119
5.1.2 Video tutorials in book and leather conservation training	121
5.1.3 Personal Reflection	123
5.2 <i>Kairouan Manuscript Project – Tunisia a northern Africa example</i>	124
5.2.1 Understanding the development of cultural heritage conservation in Tunisia.....	126
5.2.2 History of the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM)	130
5.2.3 Conservation training from the KMP	140
5.2.4 Evaluation interviews.....	145
5.2.5 Personal Reflection	149
5.3 <i>Conclusion</i>	150
6 Cultural Identity	152
6.1 <i>Cultural Sensitivity</i>	152
6.2 <i>Intercultural Communication</i>	156
6.2.1 Cultural Map	158
6.2.2 Intercultural communication in practice	165
6.3 <i>Conclusion</i>	168
7 Research Conclusion.....	170
7.1 <i>Discussion of the findings</i>	170
7.2 <i>Recommendation for Future Research</i>	175
List of Tables and Figures.....	177
Bibliography	181
Appendix.....	203

1 Introduction

This dissertation explores the complex landscape of paper conservation education, examining the challenges and opportunities that arise in the context of international knowledge exchange and sustainable training methods. The research examines the intersection of cultural heritage conservation and didactic approaches in both established and emerging educational settings. A comparative analysis of research subjects in Germany and Tunisia is used to investigate the factors that contribute to successful conservation training programmes. The findings of this research have implications for improving the quality and accessibility of conservation education globally, particularly in regions where formal training opportunities are limited.

1.1 Scope of the Study – Significance

The field of paper conservation education is confronted with substantial challenges on a global scale, with consequences for the preservation of the world's cultural heritage. These challenges are attributable to a variety of factors, including but not limited to: the uneven distribution of educational resources; the limited access to formal training in many regions outside of the western world; and the need for culturally sensitive approaches to conservation practices. Whilst there is a concentration of well-established academic training programmes in Europe and the USA, there is a lack of access to comprehensive, formal education in this field in many other parts of the world, particularly in developing and emerging countries. To fill this gap Western conservators typically run specialised workshops in these countries. Although this traditional teaching model is likely to continue for decades - partly due to the time required to develop new academic programmes and the need for local expertise - there remains significant potential to improve the effectiveness of workshops. While Western-led training initiatives in developing countries are numerous, their impact often suffers from limited duration or one-off delivery. This study addresses these limitations and proposes more effective approaches to conservation education.

An important consideration in this educational landscape is the distinction between two key levels of training: advanced courses for qualified conservators and foundational instruction for those new to the field. Further complicating the situation is the limited availability of open educational resources (OER), like video tutorials, in all conservation disciplines, especially in languages other than English.

This dissertation examines conservation education through two primary research subjects: the Cologne Institute of Conservation Sciences (CICS) at the University of Applied Sciences in Germany (TH Köln) (see chapter 5.1) and the Kairouan Manuscript Project (KMP) in Tunisia a project led by the Centre for the Study of Manuscript Cultures (CSMC) at the University of Hamburg (see chapter 5.2). Unlike Germany's established conservation education system, Tunisia lacks dedicated paper conservation training programmes. However, Kairouan's collection has benefited from international conservation training, particularly German expertise, since the 1980s, making it an ideal comparative research subject. A key challenge lies in adapting teaching methods to specific national contexts. The selection of appropriate educational materials and methodologies must ensure both theoretical knowledge and practical skills align with local requirements and international standards. Recent digital teaching innovations developed during the COVID-19 pandemic offer potential supplementary tools for conservation education in both countries, potentially enhancing pedagogical sustainability. These digital approaches provide opportunities for continuous learning beyond traditional classroom settings, ensuring the long-term viability and effectiveness of educational programmes whilst maintaining high standards of teaching quality. This research seeks to enhance training quality through international knowledge exchange, incorporating intercultural communication, and cultural sensitivity alongside appropriate teaching materials. The central question applies to both research subjects: What constitutes successful conservation training? The aim is to establish sustainable knowledge transfer systems that will develop independent conservators in both regions, with the additional goal of training local conservation specialists in Tunisia.

To summarise, there are two main research questions:

- What role can video tutorials play in the education of paper conservators?
- How can teaching methodologies in paper conservation be culturally adapted to ensure effective knowledge transfer between Western and non-Western educational contexts?

By addressing these questions, this research contributes to the development of more effective, culturally sensitive and sustainable approaches to conservation training. The following chapters will explore each of these questions in greater depth, drawing on the qualitative data collected from both German and Tunisian participants to develop a nuanced understanding of how conservation education can be improved across diverse global contexts.

1.2 Research Methodology

This dissertation uses qualitative cross-cultural research methods to gain a deeper understanding of the didactics of cultural heritage conservation, using multiple data collection techniques. The methodological framework encompasses the use of written surveys, interviews, focus groups, observations by the author, and case studies from the literature. Written surveys containing both open and closed questions were administered to German students. For the Tunisian participants, oral interviews and focus groups were used as data collection methods, considering cultural differences and hierarchical considerations.

For the German student survey, a semi-quantitative analysis was performed on the responses to both open and closed questions (see chapters 4.1.1 and 4.1.4). For these written surveys, a structured questionnaire was developed with sections addressing usage behaviour for video tutorials, satisfaction with flipped classroom methodology, and specific conservation practices. It included 5-point Likert-scale questions¹, multiple-choice questions, and open-ended questions. Surveys were distributed electronically², with participants given roughly two weeks to complete them. Response data were compiled in an Excel sheet for subsequent analysis.

For Tunisian participants, detailed notes were taken during focus groups and interviews (see chapter 5.2.4) rather than audio recordings to encourage openness and trust. The interview protocol for Tunisian participants was semi-structured, allowing for flexibility while ensuring core topics were addressed consistently across participants. Interviews typically lasted no more than 30 minutes and were conducted in settings chosen to maximise participant comfort. An interpreter was present. During interviews, particular attention was paid to non-verbal cues and cultural nuances that might influence response interpretation. Focus groups with the four Tunisian interns followed a guided discussion format with predetermined topics but flexible sequencing to facilitate open exchange. The focus group session lasted approximately one hour and covered topics related to conservation practices, professional training, and workplace challenges. Focus groups are a widely used qualitative research method that allows to gain deeper insights into the opinions, attitudes, and experiences of participants.

¹ The 5-point Likert scale, developed by Rensis Likert in 1932, is a psychometric scale commonly used in questionnaires to measure attitudes by allowing respondents to indicate their level of agreement with statements on a symmetric agree-disagree scale (typically: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)(Koo and Yang, 2025).

² Google Forms was used to collect the data electronically. Google Forms is a web-based survey tool from Google LLC that enables the creation, distribution and analysis of online surveys.(Google LLC, no date)

A focus group usually consists of a small group of people who come together under the guidance of a moderator to discuss a specific topic. The advantage of focus groups lies in their ability to capture a variety of perspectives in an interactive environment. Participants can respond to the contributions of others, which often leads to a richer and more nuanced discussion (Bell, Bryman and Harley, 2022, p. 501 ff). Notes were subsequently analysed qualitatively to identify themes and patterns in the responses. Finally, observational data was evaluated through a systematic examination of behaviours in the Tunisian laboratory and during workshops led by experts from outside the laboratory.

1.3 Challenges in relation to the research method

German students were already familiar with surveys from other contexts, so it was no obstacle for them to take part. In contrast, data collection from the Tunisian interns was more challenging. Due to cultural differences, it was not possible to use the same method. This was mainly because the Tunisian conservators felt unsure about the extent to which they were allowed to criticise their employer. In Arab countries, there are more hierarchical structures than in Germany, and respect for older people is also more pronounced (Harb, 2016), which in a professional context also means greater dependence on the employer. In addition, the younger conservators or interns felt that they had not yet gained enough experience in conservation to be able to make a judgement on certain techniques. Instead, alternative approaches were developed to consider the specific conditions and needs of the Tunisian interns. This included the use of oral interviews, focus groups, and observations, which enabled deeper insights into the intern's experiences and perspectives to be gained. Two problems crystallised in particular: Firstly, the language, as the author cannot speak Arabic and the Tunisian interns only have a very rudimentary command of English. This makes data collection and analysis more difficult, as the meaning of statements can be interpreted differently (Hennink, 2008). However, this reflects a well-known problem in the implementation of training courses in conservation in other countries: lecturers cannot be expected to speak several languages and even if it is sometimes viewed critically, English is also the language of science in conservation. On the other hand, the language also excludes many conservators and trainees from the scientific discourse. This is one reason why lecturers often are perceived as outsiders in such situations. To counteract this an interpreter was hired to provide simultaneous translation during a course held by Jane Henderson in Tunisia (see chapter 5.2.4). Interpreters can, of course, also influence the outcome of the interview and the

interpretation. This happens above all because interpreters sometimes make assumptions about a statement made by the interviewee that may not completely correspond to what was said. This is particularly the case when the interpreter has no idea about the topic being analysed. Some information may be lost in an interview situation as a result (Temple, 1997). In order to avoid this, an interpreter was employed for workshops in Kairouan who had previously familiarised herself intensively with the topic of conservation with the help of the Kairouan Manuscript Project (KMP) members but is not a conservator herself. She was also involved in the translation of the course materials, so that she was more involved in the whole process and was able to make the simultaneous translations more accurate. On previous visits to Tunisia, it was of significant benefit to have the assistance of an individual who was able to translate the discussions in the laboratory simultaneously, while also possessing an understanding of the local culture, customs, and conservation practice, thus enabling a more accurate interpretation of the employee's statements. This task of bicultural researcher (Liamputtong, 2010, p. 138) usually fell to Davison MacLaren who is a member of the KMP team, a conservator, and very familiar with Islamic cultural context.

As the interns felt uncomfortable being interviewed alone, the focus group method was used (see chapter 5.2.4). This indicates that the interns are regarded as a collective group, with no emphasis placed on the individual. This resulted in a more open dialogue between the interns and the KMP members. Furthermore, focus groups provide the opportunity to observe non-verbal signals and group dynamics.

A further issue was the establishment of trust between the KMP members and the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) staff. This was important to gain access to the objects to be conserved, but also to gain insight into the working methods. Such circumstances can prove particularly challenging when the lecturers and staff in question come from different cultural backgrounds (Liamputtong, 2008). This difficulty is further compounded when the lecturers were originally from a colonial power (Salmon, 2007).

Another method that has been adopted is that of observation, which involves the systematic observation of behaviours, events or interactions as they occur in their usual environment. This method is particularly valuable for understanding the context and environment in which teaching takes place without disturbing the employees in question. Nevertheless, it could be argued that the mere presence of an outsider can be disruptive. In the context of the KMP, observation can facilitate insights into the conservation practices and the management of the collection (see chapter 5.2.5). In what is known as non-participant observation, the researcher

maintains a distance from the subject matter and refrains from direct interaction, thereby ensuring greater objectivity (Ciesielska, Boström and Öhlander, 2018). This approach is particularly beneficial in decolonial methodologies, as it allows for the observation, the natural flow of cultural practices, and the minimisation of external interpretations. This approach enables a more authentic and respectful understanding of Tunisian conservation practice. In the longer term, this can also result in a greater gain in trust. To further strengthen trust, the usual recording of interviews or focus groups was dispensed with. Again, this has something to do with the fear from the employees of saying something wrong. To avoid this, detailed notes were taken instead. However, some information may be lost, but this was accepted in favour of accessibility to the Tunisian interns. This qualitative approach made it possible to better understand the cultural nuances and social contexts that influence the interns in their work environment.

This methodological approach is especially valuable when examining areas where knowledge about teaching conservation in different cultural contexts is limited (Denzin and Lincoln, 2005). It specifically focuses on conservator's personal experiences and context - dependent decision-making processes, prioritising the understanding of individual meanings and experiences within diverse cultural settings. The approach embraces interpretation and flexibility (Liamputtong, 2020), enabling educators to explore how individuals develop their understanding of conservation within their unique social contexts. In cross-cultural settings, qualitative research provides an excellent opportunity to convey sensitivity and reduce distrust among participants from various ethnic backgrounds (Levkoff and Sanchez, 2003). This approach is particularly useful for collecting the perspectives of people who are marginalised or silenced by dominant social orders.

Throughout data collection and analysis, measures were taken to address potential biases and limitations. Cultural differences in communication styles, power dynamics between researchers and participants, and translation challenges were explicitly acknowledged and addressed through methodological decisions.

In the context of the conservation of cultural heritage, the implementation of decolonising methodology is of critical importance in transforming research practices that have historically excluded former colonies (Liamputtong, 2010) and their cultural assets. The application of traditional research methods has frequently resulted in the imposition of Western - centric perspectives, which has in turn led to the suppression of native knowledge and practices

related to conservation. The objective of adopting a decolonising approach is to empower communities while respecting their cultural traditions and knowledge systems. This approach aims to reinstate dignity, encourage self-determination (Cram, 2009) and guarantee that conservation efforts are culturally sensitive and beneficial to the communities whose heritage is being preserved. This approach allows for meaningful collaboration between former colonies and outside experts, fostering mutual respect and understanding. By ensuring that conservation practices are aligned with the cultural values and needs of communities, it creates a more inclusive and equitable framework for heritage conservation.

2 Education in Conservation

The aim of this chapter is to provide a comprehensive understanding of the current educational landscape in conservation. It starts by considering the ethical standards and training programmes that is the foundation for a responsible conservation practice. The subsequent discussion expands to include the global context of conservation education, with a particular focus on the unique challenges faced in post-conflict and post-disaster regions, as well as in emerging countries. A particular focus is placed on the role of communities in conservation and the ways in which they can be empowered through education initiatives. Finally, it explores innovative approaches to education that will shape the future of cultural heritage conservation.

2.1 Ethical standards and training programmes in conservation practice

The evolution of conservation education spans more than two centuries, transforming from informal apprenticeships to highly structured academic programmes. During the 18th and 19th centuries, as documented by von der Goltz (2022) training methods were diverse. The most common route was through museum workshop training, where individuals often started in related artistic or craft positions before specialising in conservation. Formal academic programmes, such as the prestigious seven-year curriculum at the Bavarian Academy of Fine Arts, provided structured education. Some conservators chose self-directed learning through available conservation literature, while others pursued traditional apprenticeships under experienced painters and conservators. A hybrid approach combining practical training with self-study offered flexibility in skill development. Additionally, specialised conservation schools emerged, and some conservators took an academic route, completing a doctorate in art history before gaining hands-on experience in museum settings. This variety of training methods reflects the field's evolution from a craft-based practice to a more formalised profession during this period, laying the groundwork for modern conservation education. By the mid-19th century, training could range from months to years in artistic studio settings (Byrne-Sutton, 1995). Like in many professions, the First and Second World Wars took a hold of professional development, both in methodological and technical regards. Despite that, the University in London opened 1937 the first conservation training programme at the Institute of Archaeology while simultaneously, the Academy of Fine Arts in Vienna launched a similar initiative (Byrne-Sutton, 1995).

The devastating impact of World War II on cultural heritage highlighted the urgent need for specialised conservation training. This led to the establishment of several important institutions, including Stuttgart's painting conservation class at the "Institut für die Technologie der Malerei" (1948) under the direction of Kurt Wehlte, a similar class at the art academy Giebichstein (1951) and the pioneering scientific education programme at Berlin Weißensee (1968). These developments marked the first implementation of structured conservation curricula (Haspel, Staroste, and Landesdenkmalamt Berlin, 2014). Since the 1960s several programmes were established at an academic level, to name a few:

- 1962 Institute Royal du Patrimoine Artistique in Brussels
- 1974 Sorbonne Université in Paris
- 1974 Hochschule für Bildende Künste in Dresden
- 1977 Staatliche Akademie der Bildenden Künste in Stuttgart
- 1980 Schule für Gestaltung in Bern
- 1985 Hildesheim
- 1985 Fachhochschule Köln, since 2015 Technische Hochschule Köln (TH Köln)

Today there are nine universities in the German-speaking area, where conservation is taught, of which three teach paper conservation, one of them is the Cologne Institute of Conservation Sciences (CICS) at the University of Applied Sciences (TH Köln) which exists since 1986 (TH Köln, 2016). Because there is no legal protection of the profession, the responsibility for quality training of conservators lies with the universities. Until today public and governmental recognition is needed to further establish the profession. This continuing need for professional validation is addressed in various international conservation guidelines and charters. The International Council of Monuments and Sites (ICOMOS) Guidelines (Petzet and ICOMOS, 1993), American Institute of Conservation (AIC) Code of Ethics, the International Council of Museums – Committee for Conservation (ICOM-CC) standards and the European Confederation of Conservator-Restorers Organisations (E.C.C.O.) guidelines all mention the importance of interdisciplinary training combining artistic, technical, and scientific aspects (S. Falser, Lipp and Tomaszewski, 2010).

The AIC Code of Ethics and Guidelines for Practice (AIC, 1994) refers to point 9 "Education": *"Within the limits of knowledge, ability, time, and facilities, the conservation professional is encouraged to become involved in the education of conservation personnel. The objective and obligations of the parties shall be agreed upon mutually."*

In the AIC code of ethics, it is also mentioned that the education should follow the highest possible standards, and that the conservator should stay within the limits of his own education. A specific study or training is not mentioned. It is rather aimed at individual training in the sense of a train-the-trainer principle. This is certainly also due to the time in which the charter was created.

ICOM CC (1984) has already given more guidance in its definition of profession and the training of conservators. Point 5 “Training and Education of Conservator-Restorer” is dedicated to the education of conservators. To meet all the requirements of the profession, the conservator should have a training that includes artistic and technical as well as scientific aspects. Craftsmanship and a sensitivity for the material are just as much a part of the basics as a methodical approach and theoretical knowledge. Precise proposals are made on the theoretical foundations: *“History of art and civilisations; Methods of research and documentation; Knowledge of technology and materials; Conservation theory and ethics; Conservation-restoration history and technology; Chemistry, biology and physics of deterioration processes and of conservation methods.”* (point 5 ICOM, 1984) should be part of the curriculum. An internship should be part of the training and a degree at university level should be pursued. Finally, training should place great importance on practice without neglecting the theoretical foundation, in order to be capable to carry out highly complex conservation work.

The significance of these educational standards was further recognised by the 1997 Pavia conference, which resulted in the Pavia document (Guichen, 1998), which not only gave the conservation profession a more detailed profile but also strengthened the importance of education in that field. Shortly after the publication of the Pavia document, a research project “Conservator-Restorers of Cultural Heritage in Europe: education centers and institutes - CON.BE.FOR” (Gimondi, 2000) was established to give a better picture about the conservation education at that time. It outlines the criteria for different categories of study programmes, including undergraduate, postgraduate, and international supplementary courses. The research aims to identify the strengths and weaknesses of the existing education systems and proposes recommendations for their further development and harmonisation. The document focuses on defining the basic requirements for high level conservation education in Europe. The research identifies three categories of study programmes: Category A for university undergraduate level or equivalent, Category B for full-time initial academic study programmes at the university level, and Category C for shorter international supplementary courses for professional practitioners.

The study reveals differences in training provision across Europe and shows the need for a balance between practical and theoretical elements within programmes.

On the European Qualifications Framework (EQF)³ (European Commission. Directorate General for Employment, Social Affairs and Inclusion., 2018) the graduates should be on level 7 (Fig. 1; see also chapter 2.3).



Figure 1 EQF scale after the European Union (European Commission. Directorate General for Employment, Social Affairs and Inclusion., 2018), conservation students should be graduates on level 7 © Marlen Börngen

It was clearly formulated in the CON.BE.FOR project that the quality of teaching also depends on the learning time and teacher/student ratio. The Learning outcomes should include all the necessary competences for the graduates to be able to act according to the E.C.C.O guidelines I, definition of profession, this includes:

³ The European Qualification Framework, revised in 2017, in total there are 8 levels, the conservator profession responded very early to the new EQF scale

“strategic planning, diagnostic examination, assessment of condition, the drawing up of conservation plans and treatment proposals, preventive conservation, conservation-restoration treatments and documentation of observations and any interventions, develop programmes, projects and surveys in the field of conservation-restoration, provide advice and technical assistance for the preservation of cultural heritage, prepare technical reports on cultural heritage, conduct research, disseminate information gained from examination, treatment or research, promote a deeper understanding of the field of conservation-restoration, development in relation to research, monitoring: the evaluation of the effectiveness of treatments (quality control)” (Gimondi, 2000, p. 5).

All the above-mentioned activities must be in accordance with the E.C.C.O professional guidelines II, code of ethics. The most important thing in conservator training should be practice, which of course cannot be separated from the theoretical knowledge. The importance of working on original cultural heritage is highlighted under the teacher’s guidance with a continuous increase in difficulty throughout the course of study. E.C.C.O. also gives in the third part of their guidelines “Education” (E.C.C.O., 2004), notes on what should be taught in the training of future conservators, it’s divided into four parts: “The Basic Aims of Education in Conservation-Restoration”, “Level of education”, “Practical Training”, and “Theoretical Instructions”. The most important aim of the training of future conservators is to work independently and responsibility on the object they are intrusted with, which also includes works with: “[...] *more specialised technical, scientific and artistic aspects.*” (E.C.C.O., 2004, p. 4). As an end-to-end requirement of the profession of a conservator, the ability to work in an interdisciplinary manner is regarded as an essential goal of the training.

Concerning the time span for a professional training for conservators it should be not less than five years of full-time training at a university to obtain a master’s degree, this includes diverse internships. The possibility of a subsequent doctorate should be given after graduation.

Theoretical and practical training are given equal importance during study. Didactically suitable original objects should be treated during the study. The case studies should cover as wide a range as possible of the content to be learned, including documentation, diagnosis, and treatment. To get a greater understanding of the different aspects of the cultural heritage, learning historical techniques, and material production processes should be part of the teaching.

The following is a list of some of the theoretical content of the courses: *“Ethical principles of conservation-restoration”, “Science”, “Humanities”, “History of materials and techniques, technology and manufacturing processes”, and “Identification and study of deterioration processes”* (E.C.C.O., 2004, p. 4).

Recent standards, such as the Institute of Conservation (ICON) code of conduct (2020, pp. 2–17), continue to promote the importance of supervised training and professional development. Point 4.11 deals with the training of conservators, it says that as soon as you instruct someone in conservation you should take this task seriously and make sure that the student is always supervised. The ICON professional standard (The Institute of Conservation, 2020) look at the importance of training. The need to keep up to date with the latest developments in the field and to develop within one’s professional career is obvious. The opportunity for publicity should be taken up where possible, as well as the provision of training.

These charters have played and continue to play a huge role in developing and defining the education for conservators on an academic level and therefore building the foundation and maintaining the professional standards. The establishing of the European Network for Conservation-Restoration Education (ENCoRE) was the next logical step to standardise the training in conservation. In 1997, the first meeting of representatives from 30 different European education institutions for conservators took place in Dresden. This was the starting point for the foundation of the new “ENCoRE” 1998 in Copenhagen (ENCoRE General Assembly, 2001). At that time, the profession of conservator had not been academic for long and thus the urge for networking was great with the aim of giving more attention to the training of conservators and to promote research in conservation-restoration. The previously mentioned E.C.C.O. guidelines (established 1994, revised 2002-2004) were the basis of discussions as well as the document of Pavia (Guichen, 1998). In the founding year of ENCoRE, a meeting of 43 educational institutions, research institutes and other organisations also took place. The result was the document of Vienna (1998) which communicated the need for a clear clarification of the training institutions and equivalent educations and professional standard in the profession itself. ENCoRE should take on this task of developing and coordinating proposals for improving the educational system in consultation with the CON.BE.FOR project (Gimondi, 2000). It resulted 2001 in the document “Clarification of Conservation/Restoration Education at University Level of Recognised Equivalent” which was also drafted with the Bologna Declaration in mind.

Other non-academic training options for conservators primarily take the form of workshops, which are occasionally publicised in conservation journals. While English serves as the primary language at conferences and in publications, many significant international conservation courses remain under-publicised or unpublished due to language barriers. In countries without academic programmes, conservation training often takes place in museums, archives, or library laboratories, where knowledge is transferred from senior conservators to interns or younger professionals. This knowledge transfer can also occur through workshops led by external lecturers, either organised individually by laboratories or through established institutions.

Several major international organisations play crucial roles in providing conservation training. The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) offers comprehensive training programmes and workshops globally. Their courses range from preventive conservation, conservation management to specialised material treatments, with programmes lasting from a few days to several weeks. They particularly focus on capacity building in regions with limited access to formal conservation education (ICCROM Website, no date). ICOM-CC organises regular workshops and training sessions through its Working Groups. Working Groups are groups of conservation specialists, such as the Graphic Documents Working Group or the Education and Training in Conservation Working Group (ICOM CC, 2024). These sessions often focus on specific conservation challenges and new methodologies, providing hands-on experience and networking opportunities for conservators at various career stages. With over 4800 members in 110 countries ICOM-CC is one of the biggest organisations for conservation professionals. In Fig. 3 a map shows the distribution of members across the various countries.

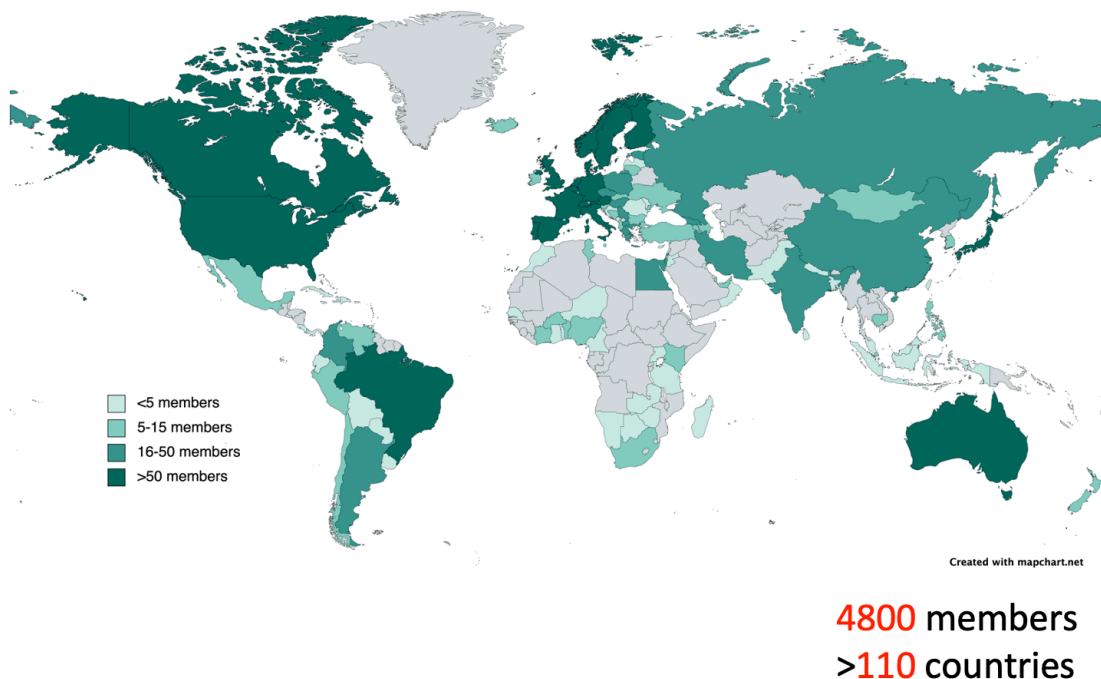


Figure 3 The geographical distribution of ICOM-CC members (© ICOM-CC, 2024).

United Nations Educational, Scientific and Cultural Organisation (UNESCO) supports conservation training through its World Heritage Centre (UNESCO World Heritage, no date a) and various cultural preservation projects. They offer specialised workshops focusing on the preservation of World Heritage sites and traditional conservation techniques.

ICOMOS concentrates on architectural and archaeological conservation training. Their programmes often address specific challenges in heritage site preservation and management, offering both theoretical knowledge and practical skills. The sub-organisation International Scientific Committee on Risk Preparedness (ICORP), for example, organises courses on heritage and risk management (ICOMOS – ICORP, no date).

ICON provides professional development opportunities primarily in the UK but also internationally. They offer workshops, short courses, and conferences covering various conservation specialties, with a strong focus on practical skills development (Icon, no date). International Association of Book and Paper Conservators (IADA) specialises in book and paper conservation training. They organise regular workshops and conferences focusing on specific techniques and materials in book and paper conservation (IADA, no date), bringing together experts from different countries to share their knowledge and expertise.

These organisations often work with local institutions to ensure their programmes are accessible and relevant to different regional contexts. Many of these organisations offer scholarships or funding opportunities to support conservators from regions with limited resources, helping to build global capacity in conservation practice.

In the forthcoming chapters, the aim is to present insights into conservation education, following by various approaches to handle cultural heritage in countries that lack formal academic training in conservation or are situated in post-conflict or post-disaster zones and the influence of communities for conservation work and education is briefly mentioned.

2.2.1 Insights into conservation education

Di Pietro *et al.* (2021) discusses the efforts to improve “transfer in the education of conservators-restorers”, particularly at Bern University of the Arts (HKB) in Switzerland. The authors identify the challenges faced by graduates in applying their knowledge to different contexts and the contradictory expectations of employers regarding the skills of graduates. They introduce two didactic projects aimed at addressing these challenges: the Skills Lab and the Connection project. The Skills Lab focuses on raising awareness of the varied nature of the conservation-restoration profession and the acquisition of key skills common to all specialisation areas. It includes visits to studios and external workshops and the development of conservation measures. On the other hand, the Connection project aims to link theoretical courses more tightly to the work in the studios, helping students apply physics and chemistry knowledge to conservation challenges. This approach at HKB represent just one example of the broader excursion in conservation training.

In a special issue of the journal *Conservation 360°: Education and Pedagogy* (Di Pietro and Broers, 2024), many aspects of conservation education are addressed in three thematic areas: “The history of conservation-restoration education and the competencies of conservators-restorers”; “The influence of societal movements on the structure and content of the curricula”; and “Didactical experiences in remedial conservation, conservation science and preventive conservation”. Among the contribution to this special issue, the article “From theory to practice: Towards integration between theoretical scientific teaching and conservation practice” (Piqué *et al.*, 2024) is worth highlighting as it asks the fundamental question of how much scientific knowledge conservators need in order to become good professionals and work effectively with scientists.

Scientific principles are essential to the entire conservation process – from material characterisation to condition assessment and treatment development. Graduates of the University of Applied Arts and Sciences Southern Switzerland (SUPSI) should understand that scientific support is important for sustainable conservation proposals, rather than limiting themselves to standard treatments. Conservation students who are initially unfamiliar with scientific principles learn the relevance of scientific concepts through hands-on experience. One challenge is the coordination between theoretical teaching content and practical application in the field. Constant dialogue between students and teachers and exchange with other educational institutions through online forums and training are necessary for improvement.

The development of practical skills in the field of conservation is also in the focus of Brückles (2019) paper “The Development of Skill Knowledge in Conservation”, showing their importance in the conservation of cultural heritage objects. The paper explores skill acquisition through step models borrowed from organisational psychology and medicine, incorporating both cognitive and practical elements. The document also addresses the stages of “*explicit and implicit knowledge*”, as well as “*factual-theoretical and practical-performative knowledge*”. Furthermore, it discusses the forms of learning, including guided learning, experimentation, emergency situations, case studies, and implicit problem solving. Professional development in conservation is mapped across five stages, from beginner to expert, aligning with both the EQF for Lifelong Learning and the E.C.C.O. standards. The research examines the need for dedicated time for skills development at advanced levels, recognising the challenges of developing treatment skills within the interdisciplinary nature of conservation. The paper explains how experts achieve successful results and develop their expertise through hands-on experience. Bridging the gap between theory and practice and establishing conservation treatment is equally important as scientific and humanistic approaches. The paper concludes by reinforcing the value of expertise in conservation, by preparing students for professional work and the need to preserve and innovate skills learning. It draws attention to the complexity and responsibility involved in treatment and argues for a greater weighting of the content of skill performance to highlight the complex and critical aspects of treatment.

A modern take on conservation education at university level is given in a paper by Pataki-Hundt (2019) “teaching book and paper conservation at the TH Köln”- University of Applied Sciences. It shows the importance of promoting and encouraging competences through the formulation of learning outcomes, which serve as the basis for different types of knowledge

referred to as taxonomy levels. The strategic guidelines of TH Köln, including employability, global citizenship, and interdisciplinarity, are highlighted, aiming to achieve internationalisation and foster student involvement in research projects. In addition, a coaching programme for new faculty members is described, with a focus on constructive alignment and flipped classroom teaching methods. It also looks at the competencies and learning spaces required for conservation graduates, and the KomM competency model, which focuses on the student's personal situation and its impact on learning. The paper also explores assessment methods, including the production of video sequences for conservation treatment steps and oral presentations, and look at the importance of student involvement and active participation in the learning process. The paper acknowledges the complex and challenging nature of didactics and its nomenclature and recognises the need for time and restructuring of teaching topics to fully adapt to new models. The paper also recognises the need for a good mix of mainstream and differentiated teaching approaches and encourages the exploration of new didactic ideas.

How teaching the necessary skills for conservators fit into the strict system of the UK Qualification Framework, as one example for distinctive levels in higher education in Europe, is asked in the paper “Using Complexity to Deliver Standardised Educational Levels in Conservation” by Henderson and Parkes (2021) from Cardiff University. The authors explore the integration of conservation practice and education, focusing on the need to align teaching levels with professional descriptions of practice. It argues for the importance of capturing progressive challenges in an auditable way, particularly in higher education, to meet the increasing pressure to make development frameworks explicit. The authors address the challenges of teaching conservation across different levels in European higher education, particularly in the UK, where conservation is taught at both undergraduate and postgraduate levels, which are defined numerically as levels 4-7. There is a need to differentiate levels on the basis of the complexity of conservation tasks and to align with the UK's ICON approach to defining conservation practice using a competency-based qualification framework. It stresses the importance of aligning learning outcomes with professional accreditation levels, such as the Icon novice-to-expert scale, and the use of problem-based learning to guide students through zones of increasing developmental challenge. The authors provide case studies to illustrate the differentiation between learning outcomes at different levels based on the complexity of conservation tasks and reflect the importance of preparing students for the reality of a career in conservation. The paper also talks about the difference in skills between recent conservation graduates and experienced professionals.

It says that more education is needed, including internships and recognition of entry-level job requirements. The paper advocates for the use of complexity in conservation tasks to differentiate learning outcomes at different educational levels, aligning them with professional standards. It also discusses the potential benefits of using the language of increasing complexity developed in the educational sector to map progression through education and the conservation profession. The authors suggest that this approach could be a useful addition to the toolkit of professional conservators to receive recognition aligned with their professional level of operation.

A more global perspective gives the paper from Cassar (2003) “Education and training needs for the conservation and protection of cultural heritage” where the need for an integrated and interdisciplinary approach to education and training in the field of cultural heritage conservation is discussed. The text puts forward the argument that the development of new skills, including teamwork, project planning, and management, is of great importance in order to adapt to the demands of working on integrated research projects. Furthermore, the author presents a counterargument to the notion of a one-size-fits-all approach, advocating instead for a global perspective that values local traditions, craft skills and language: “[...] *the complexity and diversity of world cultures gives us a global perspective that accepts that total control is impossible. It therefore argues that transparent and consistent methodologies and procedures might serve us better than prescriptive standards that simplify reality, and that while thinking globally, we must act locally with sensitivity towards local traditions, craft skills and language.*” (Cassar, 2003, p. 159). Furthermore, it draws attention to the necessity of incorporating findings from scientific research into the curriculum of conservation education courses and underscores the importance of adopting interdisciplinary and problem-centred learning methodologies. The article presents case studies, such as the Master of Science Course in Sustainable Heritage at University College London (UCL), in order to illustrate the necessity of interdisciplinary teamwork and reflective, competent, and skilled practitioners for the successful completion of conservation projects. The article also talks about using new technologies and putting research findings into educational and training programmes. It asks whether the current training is sufficient to prepare professionals for the challenges and paradigm shifts in conservation thinking.

Bringing together conservation education, research, and practice, in order to communicate properly between the multiple stakeholders a poster presented at the 2021 Triennial meeting in Beijing addressed the vital role of effective communication and mutual understanding among heritage professionals in conservation (Chassaing and Gailhbaud, 2021).

The authors identified three crucial areas where this challenge is relevant: the educational context, conservation research, and professional practice. The Institut national du patrimoine (INP), an integral part of an international network, acknowledges the necessity of a universal professional language in conservation and offers courses focused on enhancing student's foreign language proficiency and specialised vocabulary in conservation materials, techniques, and treatments. The institute conducts training programmes abroad and develops supportive resources, including a multilingual glossary, to facilitate effective communication. Precise language in fostering productive professional and interpersonal interactions seems important, noting the prevalence of non-standardised terminology and fluctuating definitions, often leading to communication barriers, particularly during international loans. Recognising that English as a lingua franca does not entirely resolve this issue, the authors introduced the Horus Condition Report (Horus CR) (SAS Horus Heritage Services, 2020) application, a multilingual digital tool designed for condition reporting in conservation. This application allows users to translate standardised inventory-related terms and generate standardised documents, as well as translate terms related to materials, techniques, and damages, which can be overlaid on artwork photographs. The tool offers translation options in eight languages, with user feedback being welcomed to enhance translation accuracy. The authors advocated for the incorporation of specialised terminology glossaries, collaborative databases, and other specific tools, alongside an appreciation of the importance of precise communication, in the education of future conservation professionals. This integration is deemed essential to prevent misinterpretation and uphold the quality of global exchanges in conservation.

A global exchange is also the goal in a conference of cultural heritage leaders worldwide in 2009 focusing on "Connecting to the World's Collections: Making the Case for the Conservation and Preservation of Our Cultural Heritage"(Stoner, 2010), multiple aspects including education and training were discussed. The report recognises the valuable input of international participants and the significance of education and training in cultural heritage preservation. The need for multi-year degree courses, short-term courses, workshops, internships, and general consciousness-raising for all staff members involved in museums, libraries, private owners, and the public were most important. The document discusses the challenges faced by participants from developing countries who felt isolated from the international conservation community after completing short courses and workshops. It recommends sustained contacts, interactions, mentoring, and social connections for effective learning and continuing development. The development of new hybrid approaches, such as formal and informal mentoring and coaching networks, to enhance education and training

were mentioned. Other important recommendations were the development of leadership and cultural engagement skills, the establishment of a Masters in Conservation Administration, support for conservation internships, collaborative work opportunities, and the provision of more resources for professional development. Additionally, it suggests creating a central website for sharing conservation education models and good practice, as well as establishing a process for translating conservation education materials.

In a similar vein in an edited volume published by Wells and Stiefel (2014) the importance of preservation education and the need to find common ground and share best practices in the field were discussed. There is little literature on preservation education at post-secondary level and more research and resources are needed. It provides an overview of the historical development of preservation education in the USA, including the influence of organisations such as the National Park Service and the National Trust for Historic Preservation. It also discusses the inclusion of preservation law and international perspectives on conservation education. Finally, it explores the future of conservation education and the importance of integrating conservation with other disciplines like design. In one chapter by Russell and Leverton (2014) titled “Delivering a Changing Conservation Curriculum by Distance Learning in the Twenty-First Century”, the value of distance learning in preservation education is discussed. It provides an UK perspective on the evolving shape of preservation education. The chapter makes a case for the delivery of educational programmes through distance and e-learning, as an alternative to traditional classroom-based tuition. The concept of “heritage” is discussed, along with the need to understand historic assets from different perspectives. The opportunities for learning through massive open online courses (MOOCs) might be promising and they suggest that distance learning can provide a diverse range of students with access to global online options in heritage conservation. The article concludes that continued research and collaboration in preservation education is essential to ensure the preservation of historic buildings and landscapes.

These case studies from the literature of various institutional approaches in conservation education reveals both distinct characteristics and common trends in how different institutions address the challenges of modern conservation training. While each institution maintains its unique focus, there are notable patterns and shared concerns that emerge from their approaches. HKB Bern’s focus on transfer skills and the integration of theory and practice through specific projects such as the “Skills Lab” and “Connection” demonstrates an innovative approach to bridging the gap between theory and practice.

In contrast, TH Köln's focus on employability, global citizenship, and interdisciplinarity, along with their implementation of modern teaching methods such as flipped classrooms, shows a strong orientation towards preparing students for the global job market. Cardiff University's structured approach to integrating complexity levels aligned with professional qualification frameworks provides a systematic model for progression in conservation education. UCL's emphasis on sustainability and interdisciplinary teamwork reflects the growing importance of these aspects in modern conservation practice, while INP's strong focus on international communication and multilingual competency addresses the increasingly global nature of the field. All initiatives maintaining a strong focus on practical training and career preparation.

The importance of scientific research methods in the field of heritage conservation is reflected in the lively professional exchange. This takes place at various levels, from international conferences and practice-oriented workshops to scientific publications. For the further development of this interdisciplinary field of research, it is essential that new methods and techniques of analysis are communicated and made available to experts (Hahn, 2012). There is also a growing emphasis on digital competencies and tools, alongside an increasing internationalisation of training programmes.

These varying institutional approaches demonstrate that regional and national characteristics continue to influence educational concepts, this diversity suggests that rather than seeking a single "correct" approach, the field benefits from multiple complementary methods that can be adapted to specific contexts and needs.

2.2.2 Cultural heritage conservation education in post-conflict or post-disaster zones

The following chapter examines the key aspects of cultural heritage conservation education in regions affected by conflicts or disasters. It addresses challenges and potential solutions, as well as the need for sustainable educational frameworks. The chapter provides insight into the requirements and characteristics of effective teaching methods in cultural heritage preservation.

Mulholland (2023), a paper conservator and technical art historian, focusing on the conservation of cultural heritage in post-conflict zones, particularly Afghanistan, explores the challenges and potential solutions for heritage conservation education in his paper entitled

“Culture, Education and Conflict: The Relevance of Critical Conservation Pedagogies for Post-Conflict Afghanistan”. The need for a more interactive, student-focused learning experience is presented, alongside an acknowledgement of the cultural expectations surrounding formal behaviourist teaching methods in traditional backgrounds. One key quote from the paper was that “[...] *it is often challenging to create a sustainable impact where cost and security issues generally mean that training takes place over an intensive, but short, period of time.*” (Mulholland, 2023, p. 12). He places particular focus on the necessity of longer-term educational structures for cultural heritage staff, additionally advocating for the development of a local curriculum for conservation and collections care at Afghan universities. His work draws attention to the significance of grasping the cultural backgrounds and learning experiences of students in Afghanistan when developing conservation pedagogies. The study shows younger participants favour aesthetic restoration over basic preventive conservation. Mulholland identifies several challenges, including the need to translate technical terms and the lack of conservation literature in local languages. He calls for a cautious, adaptable approach from international educators, and long-term institutional change in Afghanistan. The influence of international involvement in post-conflict regions and the importance of sustainable education is important. Mulholland presents the Heritage Unveiled: National Art Restoration (HUNAR) project as a case study, outlining its goals of developing skills in heritage management and conservation. Despite challenges, including adapting to online training due to the pandemic and security concerns, the project saw significant gains in participants knowledge and skills.

In a similar vein, Odegaard’s *et al.* (2014) publication “Professional Education for Afghan Cultural Heritage Faculty” also contributes to the discourse on Afghan Cultural Heritage Conservation. The paper focuses on developing a long-term professional education programme at Kabul University that can be applied to higher education institutions worldwide. The projects pilot phase, conducted at the University of Arizona, laid the groundwork for a multi-agency and international partnership, implemented the first phase of educational programmes with faculty from Kabul University, and provided feedback for future phases and funding opportunities. The article outlines the need for trained staff, proper site management, security, funding, and awareness programmes to protect Afghanistan’s cultural heritage. The goals of the project were faculty exchanges, curriculum development, and a collaborative partnership between Afghan ministries. The University of Arizona and Kabul University are working together to preserve Afghanistan’s cultural heritage by providing training in heritage conservation and set up a heritage conservation programme.

More examples for conservation education in post-conflict zone gives Tandon *et al.* (2014), a prominent figure in the field of First Aid for Cultural Heritage in Times of Crisis, as evidenced in her article “Culture Cannot Wait- International and National Courses on First Aid to Cultural Heritage in Times of Conflict”. This paper shows the importance of cultural heritage first aid in times of conflict, highlighting the changing nature of war and the need for cultural emergency response. International training courses can help protect cultural heritage to promote peace and recovery. The courses covered conflict analysis, international heritage legislation, mediation and negotiation, emergency documentation, team building, and damaged heritage recovery. Tandon’s article provides case studies from workshops in Syria, Egypt, and Lebanon, talking about experiences and challenges in different conflict contexts. She recalls the creation of an Egyptian rescue team and the recovery of artefacts from a museum. In Syria, e-learning helped build emergency response skills, while in Lebanon, a heritage training course tackled confessional divisions and attitudes towards heritage conservation.

Like the articles above, Johnsons *et al.* (2014) paper “Collaboration, sustainability, and reconciliation: teaching cultural heritage preservation and management in Iraq” values the cooperation between the various stakeholders. She discusses the establishment and success of the Iraqi Institute for the Conservation of Antiquities and Heritage in Erbil as a collaborative effort between local and international institutions and individuals. The institute offers educational programmes focusing on international conservation standards, English language proficiency, and critical thinking skills to support the preservation of Iraq’s archaeological heritage. The curriculum combines theoretical knowledge with practical exercises and recognises the importance of problem solving, critical thinking, and teamwork. The Institute faces challenges related to sustainability, graduate placement, and support from Iraqi and international partners. The programme has trained over 220 graduates who are actively contributing to the cultural heritage sector in Iraq. The institute has also established partnerships with international organisations and universities to provide students with opportunities for further education and internships abroad. The institute’s success is attributed to its collaborative approach, long-term engagement, and support from international and Iraqi stakeholders. It serves as a model for capacity building in cultural heritage communities facing significant challenges: “*The Iraqi Institute’s collaborative foci serve as a model for institutional preservation initiatives and strategies in countries that have suffered deep dislocation through armed conflict and natural disasters.*” (Johnson *et al.*, 2014, p. 7).

This quote shows the institute's collaborative approach as a model for preservation initiatives in conflict-affected regions. The article also discusses the challenges faced by the institute, including post-trauma recovery, dependence on rote learning, and the need for sustainable funding and support.

The examination of heritage conservation education in post-conflict and post-disaster zones reveals complex challenges and innovative solutions across various geographical contexts. Through case studies from Afghanistan, Iraq, Syria, Egypt, and Lebanon, distinct patterns emerge that inform effective educational approaches in challenging environments. Primary challenges include the short-term nature of training initiatives, language barriers, and cultural expectations regarding teaching methods. Looking forward, successful conservation education in post-conflict zones requires balancing international standards with local contexts, supported by sustainable funding mechanisms and flexible teaching methods. Future research should focus on developing sustainable funding models, effective evaluation systems, and understanding the role of digital technologies in conservation education. These insights can inform both policy and practice in cultural heritage conservation education, particularly in challenging environments where resources and security are limited.

2.2.3 Empowering Conservation: Education Initiatives in Emerging Countries - a few examples

This chapter explores how educational programmes advance conservation efforts across developing and emerging countries. Through various case studies, it demonstrates how education initiatives enable communities to protect their cultural heritage effectively. The examples are drawn from a range of countries, including Brazil, India, various countries in Asia, Eastern Europe, and Africa.

The ICOM-CC Working Group Education and Training published significant findings in an e-journal in 2014 regarding conservation education and training. The chapters examines projects across diverse locations, including South America (Brazil, Argentina, Chile, Colombia, Peru), Asia (Cambodia, Malaysia), Africa (Benin, Egypt, Morocco, South Africa), the Middle East (Lebanon), and the Caribbean (Jamaica) (Brown, 2014). It is mentioned across all case studies in the journal that several obstacles hinder conservation education in developing regions. These include limited local training opportunities, poor access to

conservation literatures, and geographic isolation from major conferences and workshops. Despite these challenges, significant progress has been made across multiple regions. Brazil has emerged as a leader in conservation education within South America, boasting the highest ICOM-CC membership in the region. This reflects the country's growing commitment to heritage preservation.

Brazil is also the main focus of a poster "Crossing Borders: Building conservation capacity through collaboration among Latin-American professionals" from Narrea and Vierira (2021). The need for greater provision of conservation courses in Brazil in conservation training is shown. It highlights the challenges faced by professionals in Brazil due to the lack of practical experience and interdisciplinary work. The poster describes a successful collaboration between two institutions: the Museum of Archaeology and Ethnology (MAE) at the University of São Paulo and the Ivani and Jorge Yunes Collection. These organisations jointly developed training programmes, initially focusing on metal object conservation and restoration. Following the success of their first course, they broadened their curriculum to encompass preventive conservation and the treatment of various materials, including ceramics, textiles, stone, and glass. This partnership between a private collection and a university museum has demonstrated value in two areas: promoting interdisciplinary approaches to conservation and facilitating knowledge exchange amongst professionals across Brazil and Latin America. The initiative has fostered an enduring professional network that continues to strengthen conservation training throughout Brazil.

Nunes Penna's (2018) thesis offers a personal perspective on cultural heritage preservation education in north-eastern Brazil. As a cultural heritage manager, Penna draws upon first-hand experience to examine how socio-cultural factors influence preservation training in the region. Through a critical-constructivist lens, the research analyses how political, social, and cultural contexts shape preservation education, advocating for a transformative educational approach. The study identifies several key challenges within Brazil's cultural heritage preservation education system. These include context-specific regional factors, the complexity of balancing local needs with international standards, and various historical and political constraints. Additional challenges emerge from shortcomings in the public education framework, significant technical knowledge and skills gaps, and limited public awareness and social oversight. To address these challenges, Penna presents a comprehensive set of recommendations. These begin with developing regionally appropriate approaches and creating a more thorough curriculum. The research emphasises the importance of increasing stakeholder participation and embedding cultural awareness throughout the educational

process. Further recommendations focus on fostering partnerships and collaboration, securing adequate resources, and implementing ongoing evaluation systems. Another article from Penna *et al.* (2013) examine the challenges of cultural heritage management in Brazil's North-East Region, particularly focusing on preservation efforts in areas where socio-economic hardship relegates heritage conservation to a low priority. The research advocates for shared management approaches and community participation to enhance preservation effectiveness. Using the São Luís Historical Centre Management Council as a case study, the authors demonstrate how shared management practices can succeed, whilst acknowledging their vulnerability in developing nations where continuity often proves challenging. The study identifies several obstacles to effective preservation, including insufficient political support, limited cooperation, and weak social control. These challenges are exacerbated by competing priorities such as environmental preservation, basic infrastructure needs, and public safety concerns. The authors note that inadequate legal frameworks and socio-economic inequalities further complicate preservation efforts. In their 2015 follow-up work "New teaching and learning approaches to cultural entrepreneurship for heritage conservation training programmes in Brazil" (Penna *et al.* 2015) they address these challenges by proposing new approaches to cultural entrepreneurship in heritage conservation training. Their research centres on the Centre for Advanced Studies in Integrated Conservation (CECI) in Brazil, which integrates cultural entrepreneurship into its conservation training programme. The authors advocate for a shift from purely scientific approaches towards more culturally sensitive methods that respect local contexts, suggesting that training programmes should incorporate meaningful contexts, multidisciplinary approaches, and personalised learning experiences. This transformative curriculum aims to develop professionals who can effectively manage conservation projects whilst maintaining cultural integrity and social awareness. Both studies highlight the critical need for enhanced conservation training and shared management practices to safeguard Brazil's cultural heritage effectively.

With only 16-50 conservators registered as ICOM-CC members (see chapter 2.2), India presents an interesting case study in conservation training development. The "Old Goa Revelations: New Insights into the Viceroy's Gallery" project (Reis *et al.*, 2021) demonstrates successful international collaboration in this field, focusing on the conservation of a collection of 88 paintings on wood panels and 32 on canvas from Portugal under the Archaeological Survey of India's (ASI) custody. This project provided specialised training for ASI's Science Branch researchers, looking at interdisciplinary approaches and practical skills whilst respecting local diplomatic protocols. The project's significance extends beyond immediate

conservation work, establishing a new chapter in Portuguese-Indian heritage cooperation. It developed a joint strategy that balanced stakeholder interests and provided targeted training for artwork custodians. The collaboration yielded tangible results, including the exchange of historical resources and the creation of an ASI Museum exhibition, whilst setting precedents for international guidelines on shared cultural heritage management. Sinhas's (2008) article provides a broader perspective on India's conservation landscape, particularly highlighting the Indian National Trust for Art and Cultural Heritage's (INTACH) role. The research shows the need for international exchange programmes and partnerships with leading conservation institutions to enhance local expertise. Challenges faced by Indian conservators are resource limitations and the need to develop conservation methods suited to India's tropical climate. These works collectively illustrate India's progress in conservation training, highlighting both the benefits of international collaboration and the importance of developing locally appropriate conservation solutions.

Compared to the size of the region and the multitude of cultural treasures, the number of conservators in Asia are very low. Janposri (1990) discusses the need for trained personnel in the conservation of cultural heritage in ASEAN (Association of Southeast Asian Nations) countries. The author highlights that the ASEAN countries, including Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, and Thailand, are rich in cultural heritage with a long history. However, due to the hot and humid tropical climate in the region, the deterioration of cultural materials is acute. The lack of professional conservators and limited training facilities further exacerbate the conservation problems in these countries. The current situation regarding the conservation of cultural heritage in ASEAN countries is at a basic level. The lack of qualified personnel is a major challenge, with very few professional conservators available to carry out the conservation work. A survey conducted by the Southeast Asian Regional Centre for Archaeology and Fine Arts (SPAFA) revealed the lack of qualified personnel in conservation laboratories in ASEAN countries. The author proposes a UNDP/UNESCO project to train personnel abroad and establish a network of conservation laboratories in ASEAN countries. However, finding suitable qualified individuals for training has proven to be a challenge. Each country has different levels of staff, facilities, and equipment for conservation. Most conservators have only received basic training through short courses, which do not provide a comprehensive understanding of conservation, particularly in the field of chemistry. The author suggests adjusting the training programmes to raise the professional level in the region.

Another example from Indonesia is discussed by Bakhri *et al.* (2022) examine an innovative conservation training initiative in Indonesia: the Bali Art and Heritage Conservation Internship Programme (BAHCIP). This programme introduces heritage workers and volunteers to conservation practices through a combination of online lectures and a three-week practical internship at two Balinese museums. The initiative serves multiple purposes: introducing participants to professional conservation, facilitating knowledge exchange, and encouraging formal conservation studies. Interns are selected based on their academic background, experience, and demonstrated interest in conservation. The programme's practical component takes place at two locations: Museum Pustaka Lontar and Museum Puri Lukisan. At Museum Pustaka Lontar, interns engage with Balinese language and script workshops, learn manuscript preservation techniques, and study documentation protocols. Museum Puri Lukisan provides hands-on experience in painting conservation, including dry cleaning, consolidation, and inpainting techniques. The programme benefits extend beyond the interns to include the host institutions, which gain improved conservation capacity, and the mentors, who develop valuable teaching experience. BAHCIP's success demonstrates the effectiveness of down to earth initiatives in addressing conservation challenges and building bridges between local practitioners and the international conservation community.

In Myanmar, Henderson's *et al.* (2021) paper outlines a preventive conservation training programme, aimed at enhancing conservation practices and skills among museum staff. The programme, conducted through a UK-Myanmar partnership, focused on preventive conservation measures to protect the country's diverse cultural heritage. Through two rounds of training, it significantly improved the understanding and practice of preventive conservation, leading to improved conservation practices and the development of a Myanmar Museum Standards Framework. The programme faced challenges, including the late application of preventive conservation in Myanmar, limited access to resources, and the need to overcome resistance to change. However, it successfully raised awareness, initiated a network for knowledge sharing, and facilitated the establishment of a mini-laboratory and monitoring practices for the conservation of cultural artefacts.

In Thailand, at university level, a Joint Master's Programme as a collaboration between the University of Applied Arts Vienna and Silpakorn University International College in Bangkok (Universität für angewandte Kunst Wien, 2024) aimed at enhancing the competencies of graduates in the field of conservation. The international project has carried out conservation and site management work. Students from both universities experience study periods in Vienna and Bangkok, promoting cross-cultural learning and collaboration.

The curriculum, conducted in English, provides students with skills in project management, communication, and practical conservation. Upon completion, graduates acquire valuable knowledge and experience, enabling them to compete internationally in the fields of cultural heritage and conservation.

Another successful cooperation describes Solstadt *et al.* (2008), a project initiated by the Norwegian Institute for Cultural Heritage Research (NIKU) in collaboration with the Bangladesh Shilpakala Academy (BSA) in Dhaka. The project aimed to enhance expertise in art conservation in Bangladesh through workshops, academic training abroad, and the establishment of a conservation studio. The workshops introduced conservation and practical training for students, while the academic training abroad focused on developing specialised skills in conservation. The importance of preserving Bangladesh's cultural heritage and national identity through the conservation of its art collection is shown. The article presents the challenges faced by the BSA, including the critical condition of its art collection due to degradation processes and inadequate storage conditions. It also describes the efforts to select and train students for academic conservation programmes abroad, as well as the successful completion of their training and their subsequent return to the BSA to continue conservation work. The project's impact is evident in the development of a modern conservation environment around the art collection, the successful training and return of the students, and the potential for the project to serve as a platform for the dissemination and preservation of Bangladeshi art and cultural heritage in the future.

A very practical approach in preventive conservation in Bhutanese monasteries is outlined in Cotte *et al.* (2008) article "A handbook of preventive conservation in Bhutan (Himalaya)", serving to educate temple caretakers lacking formal conservation training. This bilingual (English and Dzongkha) handbook, funded by the Rolex Awards for Enterprise, employs simple drawings and minimal text to explain deterioration causes and cost-effective prevention measures. The article places considerable weight on the importance of preventive conservation and the preservation of living religious heritage in accordance with its cultural context. This practical tool, which has been well received in Bhutan, has been shared via UNESCO with other Himalayan regions. The project's objective is to promote effective and sustainable preventive conservation practices in the Himalayan region.

These articles about conservation training in Asian countries collectively underscore the critical need for trained personnel, successful initiatives, and knowledge exchange to address the conservation challenges arising from the unique climate and cultural heritage in these regions.

Eastern Europe, especially the Balkan region has a turbulent history. Orsini *et al.* (2017) examine a significant conservation training initiative in Kosovo that aims to heal regional divisions through shared heritage preservation. The project, jointly organised by Cultural Heritage Without Borders Albania (CHwB Albania) and Heritage Without Borders (HWB), forms part of the Regional Restoration Camps series in the Balkans. Launched in Pristina in October 2016, the programme serves two primary purposes: developing sustainable heritage preservation capabilities and establishing a framework for reconciliatory dialogue between Balkan communities. The training combines theoretical lectures with practical conservation exercises, hosted by a local museum that provides both workspace and objects for hands-on experience. The programme focuses on practical, resource-conscious solutions, using local conservators and materials to ensure regional relevance. Participants work in small groups to complete full conservation treatments, including documentation and practical work, culminating in formal presentations of their achievements. The project's success lies in its dual approach: building practical conservation skills whilst fostering cross-cultural dialogue through shared heritage.

The ENCoRE (2004), newsletter documents significant developments in conservation-restoration education across Europe, particularly in the South-East region. It reports on the 4th General Assembly in Toruń, Poland, where ENCoRE and E.C.C.O. collaborated to develop unified strategies for European conservation education. The document traces the evolution of conservation training in Croatia, Slovenia, and Bosnia and Herzegovina, where traditions began with academic painters and sculptors undertaking artwork restoration. Notable institutions include the University of Zagreb (established 1669), the University of Ljubljana's Academy of Fine Arts (offering conservation studies since 1953), and the University of Sarajevo's Academy of Fine Arts. These countries conservation education programmes have been significantly shaped by historical events, including periods of conflict. Despite these challenges, they have maintained their commitment to cultural heritage protection, developing curricula that increasingly incorporate modern scientific methodologies. The significance of these educational initiatives extends beyond technical training; they serve as vehicles for reconciliation and nation-building in South-East Europe. By focusing on shared cultural heritage, these programmes create opportunities for dialogue and collaboration in a region still marked by historical tensions.

The following two case studies focuses on conservation training opportunities in Africa. The Generation 2 project (Verger *et al.*, 2002), funded by the Getty Grant Programme, focuses on learning and teaching methodology rather than multimedia technology in

education. The project faces the challenge of training museum professionals in sub-Saharan Africa. The methodology is autonomy and responsibility, with a facilitator replacing the traditional teacher. The facilitator is not necessarily an expert in the topic but possesses fundamental knowledge and practical experience. The project seeks to develop innovative educational and support materials, with a focus on critical thinking and information management. The project reveals the importance of interdisciplinary debates and the need for a direct relationship with objects and collections. The methodology includes various tools such as activity workbooks, information sheets, work sheets, and facilitator notes. The pilot phase of the project has shown benefits for both learners and facilitators, promoting autonomy, group work, and active learning. The project also explores the potential use of new information and communications technology (ICT) in conservation education. The manual for producers of educational and support materials, designed as a CD-ROM, illustrates different course structures and modes of delivery. The use of ICT in education is seen as an asset if its potential is fully exploited in terms of pedagogical aims. The project aims to offer new perspectives on conservation education programmes and the use of ICT.

Another approach is given by the article from Häkäri (2008) describes a collaboration between Namibia and Finland to improve the preservation of African cultural heritage. The collaboration involved student internships in different conservation disciplines, with the aim of covering a wide range of objects representing Namibian material culture. The students worked in various museums throughout Namibia, focusing on active and preventive conservation. They organised workshops that were found to be very useful in improving participants knowledge and understanding of cultural heritage. The collaboration aimed to support the development of a Namibian cultural identity and strengthen the preservation of tangible cultural heritage in Africa. Senior conservation students from Finland carried out their internships in various museums, starting with the National Museum of Namibia. The students assessed the condition of the exhibition and storage space, drafted treatment plans, and carried out basic cleaning. They also worked on specific preservation tasks, such as improving the condition of damaged objects and reorganising displays. The students faced challenges in their role and unclear expectations from museum staff, but they were able to make positive changes and improvements. The students also organised a workshop on preventive conservation, which was attended by over 30 people from various museum backgrounds. The workshop was successful in increasing awareness and knowledge of conservation practices.

Both case studies focus on conservation training opportunities in Africa, aiming to improve the preservation of African cultural heritage through innovative approaches. Both initiatives demonstrate a commitment to developing new methodologies, using innovative tools, and fostering collaboration to improve conservation training and preservation of African cultural heritage. It was also mentioned that a clear communication is necessary to prevent false expectations.

The literature reveals diverse approaches to conservation education across developing and emerging countries, highlighting both unique challenges and innovative solutions. Across Brazil, India, Asian countries, Eastern Europe, and Africa, common themes emerge despite distinct regional contexts. Common threads across these regions include the need for sustainable funding, locally adapted training approaches, and effective international collaboration. Success appears most likely when programmes combine international expertise with respect for local traditions and contexts, while building long-term capacity through sustainable educational structures.

2.2.4 Communities and Conservation

An important factor in conservation training is including communities connected to cultural heritage. The following articles give an impression about community engagement and the importance for the field of conservation education.

Gutierrez *et al.* (2011) provides in their paper an in-depth analysis of the role of conservation education programmes in promoting the preservation of cultural heritage. Community engagement and public outreach in creating awareness and inspiring people to celebrate and promote cultural heritage preservation seems important. The paper discusses the activities of the art conservation department at the University of Delaware, which has established connections with academic, public, and allied-professional communities to promote the value of cultural heritage preservation. The authors also provide examples of successful conservation education programmes from around the world, such as the Connecting to Collections initiative, which aims to improve the care of collections held in public trust. It discusses the benefits of conservation education programmes for students, including strengthening their curriculum and learning experiences. The authors hope that this paper will encourage the sharing of community-based learning experiences and inspire the development

of new learning experiences across conservation training programmes. Ultimately, these efforts should produce great benefits for individuals, global communities, and cultural heritage worldwide. Another hands-on example for a cooperation between communities and conservators is Sloggett's (2014) paper where she discusses the Harvesting Traditional Knowledge bark painting workshop that took place in Yirrkala, Northern Territory, Australia in 2013. The workshop aimed to bring together Indigenous artists and conservation professionals to share knowledge and approaches to the conservation of Indigenous Australian bark paintings. The workshop was organised by the Association of Northern, Kimberley, Arnhem, Aboriginal Artists (ANKAAA) and involved Indigenous traditional knowledge masters, Indigenous art workers, and conservators from around Australia. The production of bark paintings is a complex process that requires a broad set of skills and knowledge. Traditionally, the bark is stripped from the *Eucalyptus Tetradonta* tree, heated over a fire, and then flattened under weights. Ochres are sourced from the painter's own country or through trade and the palette reflects available pigments. The binder used in bark painting has varied over time, but today, artists at Buku-Larrnggay Mulka Centre use Polyvinyl Acetate (PVA) as the binder. The conservation treatment of Indigenous Australian bark paintings is complex for conservators. The paintings can present degradation and preservation issues due to the hygroscopic nature of the bark support and underbound pigments. Conservators typically use minimal intervention techniques, focusing on consolidation and stabilisation of the bark support and paint media. However, their approach is uninformed by Indigenous art practice and Indigenous ideas about preservation. Indigenous art workers, on the other hand, use traditional materials or readily available synthetic products for remedial conservation treatment. Their approach includes stabilisation, reintegration of loss, and heating barks that start to curl. Reintegration involves filling splits in the bark with sawdust mixed with adhesive and then repainting the area with the original painting materials. The Harvesting Traditional Knowledge workshop facilitated the exchange of information between conservators and Indigenous knowledge holders, artists, and art workers. The format of the workshops encouraged knowledge transfer through hands-on demonstrations, observation, and shared experiences, rather than formal lectures or presentations. It demonstrated the importance of indigenous knowledge in conservation decision-making and the need for ongoing dialogue and relationship building between indigenous communities and conservators. The workshop also raised possibilities for further research in materials science, communication strategies, and education and training.

Museums are also a place where communities, conservators and other stakeholders work together as Lewincamp and Sloggetts (2016) article “Connecting objects, communities and cultural knowledge” discussed. The two case studies: the RSL LifeCare War Museum and the Islamic Museum of Australia, explore the concept of contact zones in cultural materials conservation. The RSL LifeCare War Museum engaged with the community of residents to enhance the knowledge and preservation of their collection. The collaboration resulted in the uncovering of new information about the objects through oral histories and personal connections. The Islamic Museum of Australia collaborated with the University of Melbourne to display manuscripts from the Middle Eastern Manuscript Collection, and the goal was to engage the community and incorporate their cultural knowledge into the exhibition. The article proposes a tiered structure of contact zones, including the initial landing zone, early exploration zone, collaboration zone, and transfer of knowledge zone, to facilitate the development of community-collection engagement. The authors underscore the importance of building trust and maintaining communication in collaborative projects. The RSL LifeCare War Museum project demonstrated the benefits of visible conservation and improved collection displays in engaging the community. The Islamic Museum of Australia project faced challenges in achieving community engagement but aims to create opportunities for object-based discussions and knowledge sharing in the future.

These studies collectively demonstrate that effective conservation education must incorporate community engagement, recognising that cultural heritage preservation benefits from the integration of professional expertise with community knowledge and traditions. This approach not only ensures more comprehensive preservation strategies but also promotes cultural sustainability and community ownership of heritage conservation efforts.

2.2.5 Conclusion

This chapter analyses conservation education in many countries, particularly developing and emerging countries through a review of global education initiatives, including case studies, workshops, and internships. The analysis reveals three primary themes: structural educational barriers, sociocultural challenges, and instructional methodologies.

Structural barriers include insufficient local training opportunities, reflecting a Western-centric bias in conservation education. While short courses serve as valuable introductions, they cannot replace comprehensive training programmes. Financial constraints and limited

access to conservation literature (often due to language barriers) further hinder educational development. The lack of hands-on experience and interdisciplinary approaches poses risks to cultural heritage preservation, particularly in regions requiring specialised conservation methods for tropical climates.

Sociocultural challenges emerge when instruction is delivered across cultural boundaries.

Trust-building becomes crucial, especially when Western instructors work in different cultural contexts. Language barriers affect multiple aspects: from educational materials to conference participation. Geographic isolation and financial constraints often result in underrepresentation of developing/emerging countries in international forums. Additionally, in regions where cultural heritage preservation receives low priority, community engagement becomes essential for cultural heritage protection.

Regarding instructional methodologies, student-centred and problem-based learning approaches prove most effective when adapted to local contexts. While integrating new teaching methods in traditional settings requires sensitivity, there is growing acceptance of contemporary approaches such as constructivist and cooperative learning. Digital technologies offer promising solutions through distance learning and e-learning platforms, particularly for theoretical aspects of conservation education.

The synthesis suggests that successful conservation education requires careful consideration of local traditions, craft skills, and linguistic diversity, rather than applying a universal approach.

2.3 Integrating innovative approaches in cultural heritage conservation education

Conservation education has evolved significantly since the introduction of formal degree programmes. The 1980s and 1990s imposed strict entry requirements, including three-year pre-study internships and a pre-assessment. However, contemporary programmes have adopted more flexible admission criteria, with some institutions, such as the University of Applied Sciences and Art Hildesheim⁵, eliminating pre-assessment tests entirely. Pre-study internships are now usually only one year long at all university programmes.

⁵ Website HAWK Hildesheim: “Since the winter semester 2020/21, you will receive the Bachelor of Science degree for the Bachelor’s degree programme Conservation and Restoration. As an applicant, you no longer have to present an artistic portfolio and do not need a qualifying examination.” (<https://www.hawk.de/de/studium/studiengaenge/bsc-konservierung-und-restaurierung-hildesheim/bewerbung>, accessed 12.04.2024), translation by the author.

This shift has welcomed students from diverse academic backgrounds, including both humanities and sciences.

Despite the broadening of admissions, the pedagogical approaches within cultural heritage conservation programmes have remained deeply traditional, especially in Germany. The curriculum is heavily anchored in hands-on work with original objects, demanding a high degree of responsibility and meticulous supervision due to the invaluable nature of these artefacts. The theoretical and practical components of the curriculum are intended to be balanced; however, the prevailing conservative and didactic methods, which include frontal instruction and a tightly structured timetable, often lead to a high examination load and may not facilitate the most effective learning experience. Rigid curricular structures hinder the introduction of varied teaching methodologies and limit the promotion of individual abilities. The challenges faced by conservation education are multifaceted. The bachelor's programmes are frequently criticised for their overwhelming breadth of content, which can dilute students' focus and lessen their engagement with practical work. Compounding this issue is the fact that faculty resources are often stretched thin, making it difficult to deliver comprehensive education in both theory and practice. There is a pressing need for conservation education to evolve, fostering skills that enable students to work methodically and scientifically, to think conceptually, and to act independently after graduation. The current system often fails to account for the diverse educational backgrounds of its students, leading to gaps in knowledge. To address these challenges, conservation education must undergo a pedagogical shift that not only maintains the integrity and high standards of the discipline but also adapts to the changing profiles and needs of students.

Something that is not new but needed adaptation for the conservation-restoration profession is the European Qualification Framework (EQF). Hutchings and Corr (2012) discuss the development of a framework that maps the specialist competencies required for the profession. This framework aims to harmonise educational qualifications across Europe, using concept mapping to identify key competences and aligns them with the EQF. It highlights the challenges in interpreting the generic EQF descriptors for Level 7⁶ and benchmarking them against the Conservation-Restoration profession norm. The framework, endorsed by the professional community, offers a flexible pathway into the profession and serves as a quality assessment tool for educational courses. It is now the basis for academic training as a

⁶ EQF 7 represents the minimum level for practicing the profession in relation to knowledge and skill according to E.C.C.O., Fig. 1 in chapter 2.1

conservator. The education of conservators-restorers is examined by Di Pietro *et al.* (2021), they identify the need to improve the transfer of knowledge and skills from theory to practice. They advocate for educational units that integrate scientific knowledge with practical conservation scenarios. Addressing the disconnect between employer expectations and graduate competencies, they highlight initiatives like the Skills Lab and the Connection project (chapter 2.2.1), which aim to bolster transfer competencies among students.

Achille and Fiorillo (2022) contribute to the discourse by drawing attention to the shifting professional figure in cultural heritage due to technological advancements, especially during COVID and Post-COVID. They advocate for a pedagogical approach that nurtures critical thinking. The success of hands-on training illustrates the necessity for lifelong learning strategies. Furthermore, they call for educational programmes adaptable from primary education through adulthood, underlining the need for continuous updates in teaching methodologies to mirror the rapid evolution of technology.

Serious games have emerged as a groundbreaking tool in the field of cultural heritage, as detailed by Mortara *et al.* (2014). These games aim to achieve educational objectives such as cultural awareness, historical reconstruction, and heritage appreciation. By engaging users in an interactive and immersive experience, serious games transcend traditional learning methods, leveraging multimedia content and user assessment methodologies to foster a connection with cultural heritage. Such games not only complement existing educational resources but also serve as a standalone gateway for the public to experience and learn about cultural heritage dynamically. DaCosta and Kinsell (2022) also explain the awareness that serious games, but also virtual reality (VR) and augmented reality (AR), can create for heritage preservation, acting as a bridge for communication with scientists, conservators, and involving the public. Games provide access to heritage sites otherwise inaccessible to the broader community. Using board games as a tool for educational purposes in conservation is another idea as shown in the paper from Liu (2023). It discusses the development of a multi-player board game designed to provide a fun and educational overview of preventive conservation and museum management. The game aims to embody the complex nature of museum work and involves players representing different museums, making decisions, resolving incidents, and answering questions related to various scenarios in museum settings. The game illustrates the significance of coordination, cross-departmental communication, and collaboration in the operation of a museum by demonstrating the potential for effective knowledge dissemination to a broader audience and for use in training programmes within the conservation community and museum education.

Especially during and after COVID-19, learning and teaching at a university was a challenge but it also gave the opportunity to adapt and expand the teaching skills. ICCROM (Pedersoli Jr., 2020) did a survey about teaching heritage conservation amid COVID-19. The results of the survey identified several challenges faced by educators, including time pressure, management, the shift to online teaching, and the lack of hands-on work. On the other hand, positive aspects of online teaching include improved interactions with students, fostering innovation, and increased accessibility and availability of content. The use of new teaching aids, tools, and resources, as well as the importance of fostering innovation, adaptation, and resilience is discussed. However, it also acknowledges the limitations of online teaching, such as the lack of hands-on experience and in-situ learning.

Drawing from direct university experience during the pandemic, this author observed significant challenges in maintaining student motivation, particularly after many returned home. This proved especially problematic for conservation-restoration students, whose practical learning was severely impacted by the inability to conduct hands-on work. While the university eventually reopened for practical programmes under strict protocols, there was a crucial period of over one semester when teaching moved online, requiring students to work with mock-ups at home. Student responses varied considerably; some struggled with the format, while others flourished, using the additional time to develop creative solutions. A notable adaptation was the online pre-assessment test, which included an innovative practical exercise requiring candidates to create protective packaging for a raw egg using household materials. Some candidates demonstrated remarkable creativity, submitting video evidence of their packaging being tested. To maintain educational quality, teaching staff implemented various digital solutions, including pre-recorded tutorials, Zoom sessions, and remote training using mock-ups. While this period yielded lasting benefits through enhanced digital tools and capabilities, the experience highlighted both the potential and limitations of online learning in conservation education. The resistance to permanent change in conservation-restoration programmes underscores the need for careful consideration when implementing new teaching methods.

The teachability of creativity emerges as a crucial consideration in conservation education, where professionals must constantly adapt their approaches to unique objects. McWilliam (2007) examines creativity's evolving role in higher education, noting its transformation from a luxury skill to an essential workplace requirement. The research shows how higher education must prepare students for increasingly digital, fast-paced environments where creative problem-solving is fundamental. Particularly relevant is the emergence of the

“gamer” generation, whose distinct learning preferences and social engagement patterns require new educational approaches. McWilliam advocates for an educational culture that embraces experimentation, playful learning, and comfort with ambiguity. This shift aims to develop creative capabilities in both students and educators, preparing them for a rapidly evolving professional landscape where traditional approaches may no longer suffice.

3 Didactic theory and use in conservation education

There are numerous terms in the broad field of education. Some terms are clear, while others are more difficult to grasp, as their meanings overlap or merge without clear distinction. This chapter examines didactic concepts and their applicability to conservators training. It begins by analysing general terms of learning and the learning theories: behaviourism, cognitivism, constructivism, and connectivism, before explaining Bloom's Digital Taxonomy and the SAMR (Substitution, Augmentation, Modification and Redefinition) Model, which provide frameworks for integrating technology into learning goals and activities. A significant portion is dedicated to John Hattie's influential meta-analysis research on factors influencing student achievement. Throughout the text, connections are made between didactic theories and concepts to real-world examples in conservation education.

3.1 General Terms of Learning

The educational system constantly changes to catch up with technological progress, society and didactical approaches and many terms have emerged from this ongoing process. Pedagogy, andragogy, and heutagogy, for example, developed with distinct individual meanings, while at the same time being closely intertwined in substance at the heart of educational theory. Each term represents a specific learning environment. Many definitions of "pedagogy" go back to Knowles (Knowles, 1973, p. 42) where it is explained that the term translates from Greek to "guiding the child", giving "pedagogy" the literal meaning of "the art and science of teaching children". It could be argued, in the conventional sense, pedagogy relates to instructional techniques and procedures, particularly those designed with younger students in mind. Today, it is a common word used by teachers to help students learn, not just children. In pedagogy, the strategies are mostly teacher-centred, which means that the instructor serves as the main authority and source of knowledge. The curriculum is usually planned and standardised, with a focus on lectures, demonstrations, and memorisation. This method is crucial in early childhood and elementary education, as young students need more organised support and direction. Knowles also characterised the term "andragogy" in 1970 in his book "The modern practice of adult education: Andragogy versus Pedagogy." (Knowles, 1970), it largely refers to adult education. The word comes from Greek and means "guiding the man". Initially, he presents these two terms as mutually exclusive. However, in a revised edition of his book published in 1980 "The modern practice of adult education.

From Pedagogy to Andragogy.”, he softens this stance, recognising that andragogy can also be applied to teaching children, and vice versa. The terms are simply put “*two ends of the spectrum*” (Knowles, 1980, p. 43). As adults learn differently from children, andragogy recognises this difference and promotes a more self-directed approach. The model assumes that adults take an active role in planning and evaluating their own education and pursue a learner-centred approach to learning. A key component of andragogy is experiential learning⁷ (see chapter 3.5.6), as adults bring a wealth of personal and professional experience to the learning process. The emphasis is on problem-solving and the practical application of information, with internal motivations such as professional and personal development taking centre stage. This concept is not without criticisms, mainly because the teacher still determines the learning process (Glassner and Back, 2020, p. 63). “Heutagogy” expands the concepts of andragogy to include the area of self-determined learning. The term “heutagogy” was first defined in 2000 by Stewart Hase and Chris Kenyon (2001). It aims to foster autonomous, self-directed learners who can adapt to a complex and ever-changing environment. In the context of today’s educational learning, self-determination is of the utmost importance. Learners take full control of their educational training by setting their own goals and evaluating their progress. The learning process is non-linear and allows for flexibility and customisation. Heutagogy builds on the framework of emphasising the development of learner’s skills, such as critical thinking, problem-solving and adaptability, rather than the mere teaching of skills. In addition, learners must engage in reflective practice in which they continually evaluate their experiences to learn from both successes and failures. This approach is particularly important in higher education, lifelong learning and professional environments where innovation and adaptability are crucial.

Although each approach possesses distinctive characteristics and applications, they are not mutually exclusive. Effective education frequently requires the integration of pedagogical, andragogical, and heutagogical methods, which are tailored to align with both student requirements and the learning environment.

The following example showcases how the theories of pedagogy, andragogy, and heutagogy interact in a conservation education setting: A workshop on book and leather conservation at TH Köln. Students from different semesters, at different stages of their conservation training and with different levels of experience are assigned the task of performing a conservation treatment on a leather-bound book. To do this, they attend a lecture on the basics of proteins

⁷ “Experiential learning” describes an educational approach where knowledge is acquired through direct experience and reflection on doing, rather than through traditional classroom instruction. This method emphasises hands-on engagement and practical application of concepts (see chapter 3.5.6).

and leather conservation. These basics serve as an introduction and orientation to the material, explaining fundamental concepts such as the chemical composition or the production of leather. This introduction is given by a lecturer and therefore has a very pedagogical character. Within the practical work on the leather book, there are topics that students are interested in and subsequently want to explore independently; this can also be done in teams across semesters. In the context of book conservation, this could be the reproduction of historical binding techniques or the pairing of leather using different knives. This has a strong andragogical character, as the students can choose their own topics, but the lecturer continues to provide support during the realisation. If the students were to try out a new technique independently during their studies on the basis of the knowledge previously imparted, this would be a heutagogical approach. This could be, for example, the pursuit of new approaches to determining the shrinkage temperature of leather during the literature research. Students have the freedom to choose their own methods and approaches and explore new technologies. Pedagogical and andragogical principles will be used for the presentation and feedback in the leather conservation course. The results of the work are presented in an open form by presenting the results of the conservation orally and in front of the object; theoretical content can also be presented in an open examination format such as “Uno Uno” (Pataki-Hundt and Börngen, 2024), an innovative approach where students sit in a circle, pose self-formulated questions to their peers, and answer them, creating a supportive learning environment with flat hierarchies and equal participation. Participants receive direct feedback from lecturers and fellow students. The experiences and findings obtained during the semester are reflected upon. Based on this feedback, the students develop approaches in book and leather conservation further independently, e.g. in term papers or BA theses, which again follows a strong heutagogical approach.

This scenario shows how pedagogy, andragogy and heutagogy can intertwine to create a comprehensive and effective learning experience that meets the needs and abilities of all students.

3.2 Learning Theories

Building on the general concepts of pedagogy, andragogy and heutagogy, there are other learning theories that attempt to describe learning in more psychological terms. These are basic concepts that try to explain how people absorb, understand and retain knowledge. These concepts can help lecturers to implement successful learning and teaching scenarios.

Each of the teaching scenarios concentrate on a different aspect of learning. The best-known theories include behaviourism, cognitivism, constructivism and connectivism. Each of these theories offers valuable insights into how learning processes can be optimised and how teachers can adapt their methodology and strategies to enhance the learning experience and maximise learning success.

Fig. 4 shows an overview of these four concepts.

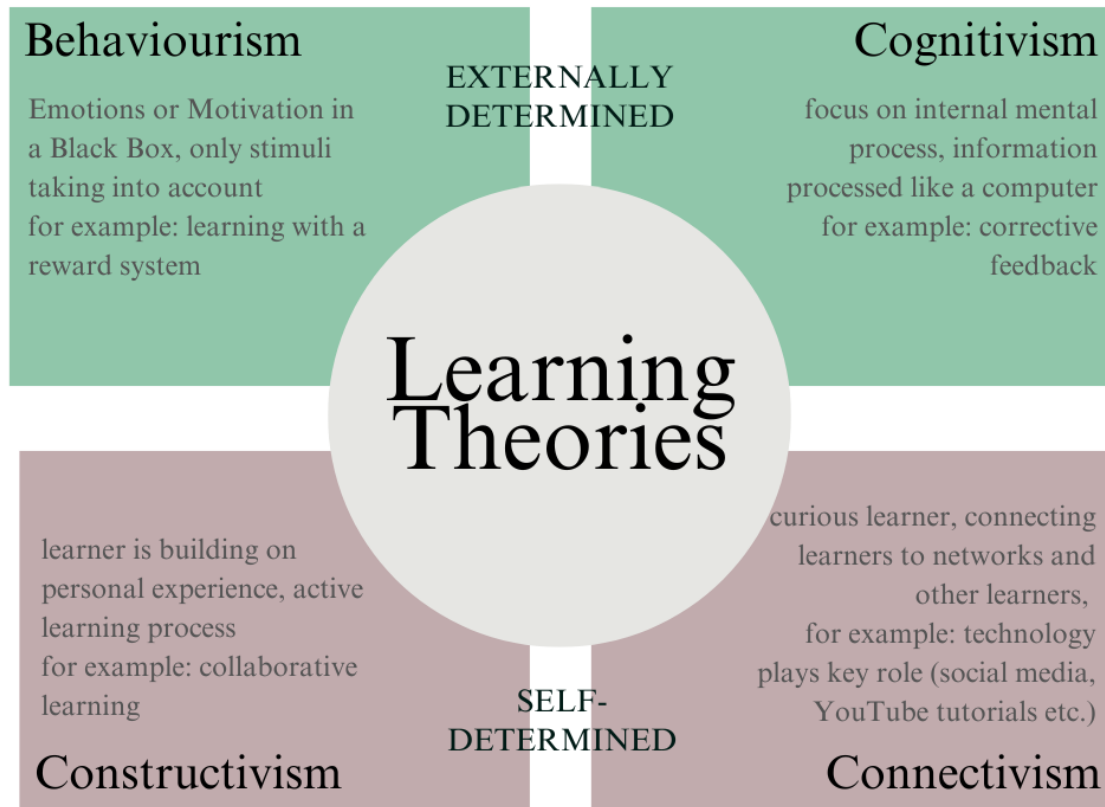


Figure 4 Four Learning Theories: Behaviourism, Cognitivism, Constructivism and Connectivism and their main characteristics © Marlen Börngen

This chapter explores in detail these four learning theories that have emerged over time, examining both the way in which teaching is delivered and the role of new media within these learning processes. It also examines how traditional learning processes are complemented and enhanced by new approaches. Finally, examples from the field of cultural heritage conservation education are given.

3.2.1 Behaviourism

Behaviourism is probably the oldest of the learning theories and goes back to John B. Watson. In 1913, he described his theory for the first time in an article entitled “Psychology as the Behaviorist views it.” (Watson, 1913). This pedagogical orientation is based on the premise that observable, measurable behaviour is the foundation for learning and teaching. This theory rests heavily on the natural sciences in that only behaviour can be measured, but not, for example, states of consciousness such as fear. Only the reaction to a stimulus is measured, all other sensations such as emotions or motivations remain hidden in the so-called „black box“ and are not of interest to this model.

The behaviourist approach to education is founded upon the principles of conditioning, which may be divided into two categories: classical conditioning, as elucidated by Ivan Pavlov, and operant conditioning, which was operationalised in particular by the work of B.F. Skinner (Skinner, 1938). A good example of classical conditioning is the conditioning of a dog that has been conditioned to salivate at the mere sound of a bell and to look forward to eating, even if the food is not yet there (Goerigk and Schmithüsen, 2019). Operant conditioning is about consolidating behavioural changes through reinforcement, which can take the form of either positive reinforcement (reward) or negative reinforcement (removal of a negative stimulus). In the context of education, this means that educators can use reinforcing stimuli to reinforce desirable learning behaviour, while discouraging undesirable behaviour by ignoring it. If you give a child sweets for a good mark in an exam, the child will ask for sweets again the next time they get a good mark.

Objective measurement of learning progress through tests and practical exercises plays a central role in ensuring the achievement of learning objectives. In the context of behaviourism, new media can be used to implement immediate feedback and reward systems. Learning platforms and e-learning software provide opportunities for drill-and-practice exercises where correct answers are reinforced with points or virtual rewards (Arnold, 2005). Although this model is widely used in practice, particularly in the design of learning materials and the conceptualisation of curricula, it has also attracted criticism. Today, these approaches are considered outdated. The criticism is primarily directed at the neglect of the internal, mental processes of learning, such as motivation, thoughts and feelings (Schönpflug, 2016, pp. 21–26). These processes go beyond the pure behaviourist view and are given greater consideration in the following theories

3.2.2 Cognitivism

Cognitivism is an important learning theory that emerged in the 1950s and 1960s as a reaction to behaviourism. While behaviourism focuses strongly on observable behaviour and external stimuli, cognitivism focuses on the internal mental processes that play a role in learning.

Positive experiences that people gain from their surroundings, including interaction with other people, all lead to a better learning process. This theory views learning as an active process in which information is absorbed, processed, stored and retrieved, like a computer would do. A person's behaviour is therefore influenced by the fact that we perceive a stimulus from outside which is then processed in our brain through cognitive processes before we react to the stimulus. It is necessary to engage with the learning content to fully understand and comprehend it. According to this model, the following should be taken into account when designing learning materials: a clear design is important to draw attention to what is to be learnt, it should build on existing prior knowledge and repetition is important (Kuhlmann and Sauter, 2008). Cognitivism also emphasises the role of memory in the learning process.

Information must be effectively encoded and transferred to long-term memory in order to be used in the long term. Repetition and practice play an important role here, as they facilitate the consolidation and retrieval of information. There are different models in cognitivism. There is model learning, whereby a person learns by copying and imitating behaviour. In learning through insight, the so-called "Aha!" effect is paramount, whereby a problem is recognised, reconsidered and a solution is found. The importance of metacognition, i.e. awareness and control over one's own thought processes, is also emphasised. Learners who use metacognitive strategies are better able to plan, monitor and evaluate their learning, which leads to more effective learning processes (Petko, 2014, p. 28). Another important element of cognitivism is the role of instruction. Teachers should create learning environments that encourage active learner engagement and enable them to place new information in meaningful contexts. This can be supported using examples, analogies and visualised representations. Teachers should also help learners to develop effective learning strategies and organise their knowledge. Cognitivism has far-reaching implications for educational practice. It suggests that teachers should not only be knowledge providers, but also supporters and facilitators of their student's cognitive development.

Cognitive theories are criticised for their imprecise explanations of complex learning processes and for limiting human perception exclusively to cognitive processes. Social, emotional and motivational aspects are neglected.

In addition, they adhere to the external controllability of learning processes, as introduced by the behaviourists (Grogorkick and Robra-Bissantz, 2021).

Cognitivism, which emphasises the internal mental processes of learning, benefits considerably from the possibilities of new media. Interactive multimedia applications, simulations and virtual labs offer learners the opportunity to visualise and manipulate complex concepts. These tools support cognitive processing and help translate abstract ideas into concrete experiences. In addition, new media promote the use of metacognitive strategies by helping learners monitor and control their own learning processes (Kuhlmann and Sauter, 2008).

3.2.3 Constructivism

Like cognitivism, constructivism examines the processes within the human mind. We perceive the environment individually through our sensory organs, thereby creating our own unique reality. In recent decades, constructivism has emerged as a prominent learning theory in educational research. Learning is understood as an active and individual process in which knowledge is not simply transferred from one person to another but is constructed by the learners themselves by linking new information with their existing knowledge and experiences. The most effective method of learning is to engage with knowledge independently and recognise connections, thereby anchoring the knowledge in the brain for the long term (Baumgartner and Payr, 2001). Consequently, learning environments should be designed in such a way that they offer realistic problems and tasks that are relevant and meaningful for the learners. These authentic tasks not only promote a deeper understanding of content, but also the ability of learners to apply their knowledge to new and different situations. This therefore promotes critical thinking and problem-solving skills. The role of the teacher in the constructivist approach differs significantly from that in traditional teaching models. Instead of acting as a mediator of knowledge, the teacher acts more as a coach of the learning process. They create an environment conducive to learning, provide appropriate resources and offer guidance and support when necessary (Kuhlmann and Sauter, 2008). The integration of technology and new media can play an instrumental role in the creation of constructivist learning environments. Interactive learning platforms, educational videos, social media, and simulations provide learners with the opportunity to engage in learning and work in realistic contexts. This enables the personalisation and tailoring of learning processes to individual interests, thereby promoting a deeper understanding of content and the

development of essential social and communication skills (Grogorick and Robra-Bissantz, 2021). In contrast to the preceding theories, constructivism suggests that learning is an active process that should enable learners to adapt and apply knowledge in a complex world with constantly changing challenges.

3.2.4 Connectivism

A relatively recent learning theory is that of connectivism, which was initially characterised by the article by Siemens: “Connectivism: A Learning Theory for the Digital Age” (Siemens, 2004). Technological developments are considered as they have significantly changed learning and teaching over the last two decades. Connectivism emphasises that knowledge exists in networks of connections and that learning involves the ability to traverse and maintain these networks. Consequently, the traditional linear model of learning is no longer sufficient; instead, learning must occur within a network. The Internet and social networks are central components of this approach, as they provide access to a lot of information and the opportunity to network with experts and peers around the world. Teachers are often mentors in this learning process and provide support in this open learning environment by giving feedback and active listening. Consequently, learners are able to continuously assimilate new information and adapt to the ever-changing landscape of knowledge (Grogorick and Robra-Bissantz, 2021).

3.2.5 Conclusion in the context of conservation

The field of learning and teaching is characterised by a combination of the learning theories described above, although there are undoubtedly many others that have not been mentioned here. If one relates these learning theories to the concept of conservation, a few case studies come to mind.

Examples of behaviourism are rather scarce, as this theory, as previously outlined, originated in the early 20th century and entirely disregards the aforementioned “black box”. In the context of teaching conservation, it is notable that the use of reward systems is relatively uncommon. It is conceivable that students could be rewarded for good academic performance by being permitted to attend an excursion for example. Nevertheless, this should not be the primary stimulus for successfully completing the conservation of a work of art.

Such stimuli should be based on the intrinsic motivation of the students. On the other hand, praise from the professor or other lecturers can provide students with motivation for future work. A cognitivist approach to conservation could entail the use of visual aids or mock-ups to facilitate the comprehension of complex conservation techniques. In that case, all the information acquired during the conservation of a mock-up can be retained and subsequently applied successfully to the original object. As outlined by Stoveland *et al.*, (2021) the use of mock-ups can facilitate the expansion of the learner's skillset and knowledge base, while reducing the risk to the object. This approach can assist newer students in developing self-confidence in handling the objects. The lecturer retains a key role in the learning process, actively disseminating knowledge through demonstrations of conservation techniques.

In accordance with the principles of constructivism, students are encouraged to devise their own solutions to conservation problems during the practical conservation course on the original object. Students are required to assess the damage, select suitable conservation materials and carry out the conservation work. This approach is particularly suited to higher semesters or even fully trained conservators, where the teacher assumes the role of a mentor. This approach encourages active learning and the application of knowledge in real contexts, allowing students to deepen their skills and understanding. This approach is common in conservation study programmes in Europe (Pataki-Hundt, 2019).

It is evident that conservators have historically demonstrated a preference for networking, primarily due to the limited number of conservators globally. This has led to a necessity for the exchange of information on novel conservation methodologies on a global scale. Dardes (2002) published an article in which he predicted how the Internet would transform the training of conservators. The potential for sharing educational materials and exchanging information online represents a significant advantage. The connectivist approach outlined in the text could also encompass the use of online platforms and social media to encourage knowledge and experience sharing among conservators. For example, Brown and Todd (2008) report on their experiences of an online conservation course on preventive conservation. In a similar vein, Lambert *et al.* (2017) report on the benefits of blended learning in a course on storage reorganisation in several countries. Such examples demonstrate the networking of students and professionals on a global scale, facilitating the sharing of information and the acquisition of knowledge from one another.

The application of learning theories in conservation programmes and courses can facilitate the creation of versatile and effective learning environments that assist students and adult learners in developing both theoretical knowledge and practical skills.

Nevertheless, the integration of new media into conservators learning environments also necessitates critical reflection and meticulous planning. It is of the utmost importance to ensure that technology is integrated into the learning process as an integral component, rather than merely as an adjunct. It is crucial for teachers to be aware of the relative merits and drawbacks of various media and to use them in accordance with the tenets of the respective learning theories. It is also important that the use of new media is genuinely supportive of learning and does not lead to distraction or superficial engagement with content.

3.3 Didactic Concepts

The literature contains many different learning and teaching concepts, some of which - despite being named differently, convey very similar ideas. Others have evolved into popular buzzwords, necessitating a clearer definition of their meanings. The following chapter aims to clarify common terms used in didactic teaching methods and provide a foundation for the subsequent chapters. Starting with Blooms Digital Taxonomy and the SAMR model, which explores learning goals in the context of the 21st century. It then looks at John Hattie's meta-analysis and its potential transferability to conservation education. Following by terms and concepts commonly used in the recent years mainly in a university setting. Examples of didactic concepts used in a conservation education context are drawn from the author's personal experience at the TH Köln.

3.3.1 Blooms Digital Taxonomy

Bloom's Digital Taxonomy is an enhancement of the original taxonomy and Krathwohl's revised version. Benjamin Bloom created his taxonomy in the 1950s and published it in the "Taxonomy of Educational Objectives: The Classification of Educational Goals" (Bloom, 1956). Krathwohl (2002) presented a revised version of the taxonomy based on changes in educational research and practice, which significantly changes how we view teaching and learning today. One of the primary changes between the original and the revised version is in the terminology used to describe the cognitive processes. The original taxonomy used nouns such as *Knowledge*, *Comprehension*, *Application*, *Analysis*, *Synthesis*, and *Evaluation*. In contrast, the revised taxonomy employs verbs to label these processes, making them more dynamic: *Remember* (renamed from the original Knowledge), *Understand* (renamed from the original Comprehension), *Apply*, *Analyse*, *Evaluate*, and *Create* (renamed from the original

Synthesis and changed position with Evaluation). This shift underscores a more active conception of learning. Another significant change is the reordering of categories. In the original taxonomy, Synthesis preceded Evaluation. The revised taxonomy places Evaluating before Creating, indicating that higher-order thinking involves evaluation before creation. The original taxonomy shows the hierarchical nature of cognitive skills, suggesting that mastery of simpler skills was a prerequisite for more complex ones. The revised taxonomy, while still hierarchical, allows for some overlap between categories, reflecting a more flexible understanding of cognitive processes.

The digital version from Bloom's Taxonomy (Fig. 5) developed from Andrew Churches (2007) considers the contemporary requirements and possibilities of the digital era. This adaptation is a consequence of the fundamental changes that have occurred in the educational environment because of technological advances and the widespread availability of digital tools.

The structure of Bloom's Digital Taxonomy is maintained, but digital skills and tools relevant to the 21st century are integrated. For instance, activities like blogging, using data analysis tools, and creating digital content are incorporated into the traditional categories, emphasising the development of digital competencies.

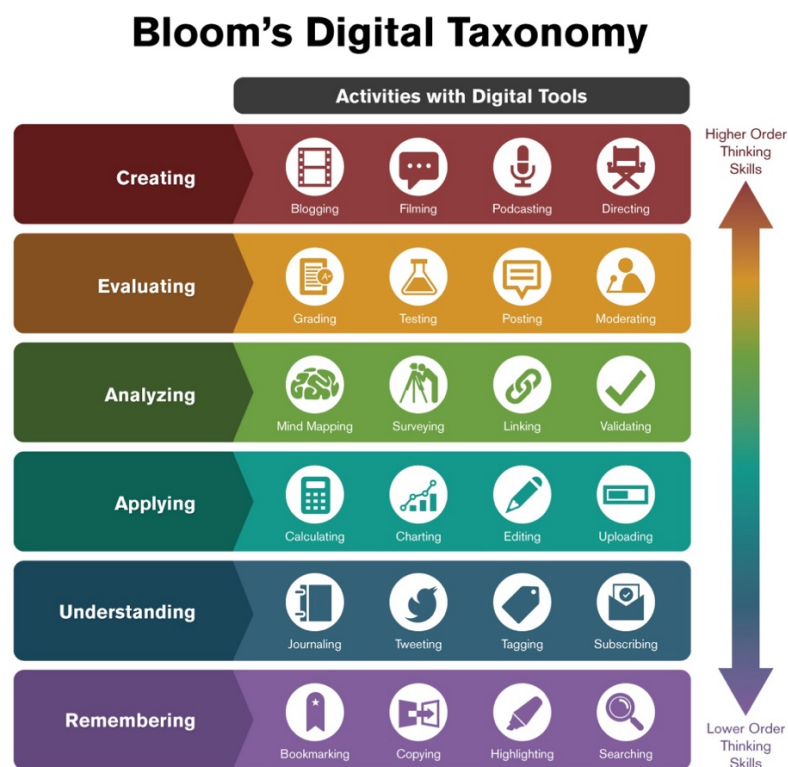


Figure 5 Blooms Digital Taxonomy Infographic (© Carranza and Sneed, 2016)

The terminology employed in Churches “Bloom’s Digital Taxonomy” are the following.

The acquisition of knowledge frequently commences with the *remembering* of information. Such processes can be facilitated by digital activities, including the use of search engines, the practice of bookmarking and the act of memorising web pages. Such activities assist learners in the collection and organisation of fundamental information, which serves as a foundation for subsequent learning. Simple tests, such as multiple choice, can facilitate learning at this ability level. Applications such as Google⁸ and Notability⁹ can also be of assistance in this regard. The subsequent stage, *understanding*, is attained through the processes of explanation and interpretation. Digital tools, including blogs, vlogs and online discussions, provide learners with the opportunity to express and share their knowledge. By writing blog posts or commenting on articles, learners can improve their comprehension and develop their ability to communicate information clearly and accurately. In this regard, digital applications such as X¹⁰ or WordPress¹¹ may be employed for the purpose of composing a tweet or blog. Another crucial aspect of the learning process is the *applying* level. In the digital taxonomy, this encompasses activities such as the creation and uploading of videos, the editing of documents, and the sharing of content on social media platforms. Such practical applications assist learners in transferring theoretical knowledge into real-life situations and consolidating their skills. For instance, mind mapping software such as Miro¹² may be employed to facilitate this process. The next stage, *analysing*, requires the application of critical thinking and the ability to break down complex problems into their component parts. Digital tools, including data analysis software, online search engines and collaborative platforms, facilitate this process by enabling learners to compare data, identify patterns and draw informed conclusions. Furthermore, it provides opportunities for learners to engage in discussion. The *evaluating* of information and arguments represents a further central component of the digital taxonomy and can be facilitated by online discussions or peer review processes. Such help enhance the learner’s ability to make well-informed judgements and to consider a range of perspectives. The *creating* of new concepts and products requires the use of creative abilities and digital resources. Such activities may include the programming of software, the production of multimedia content and the development of interactive projects.

⁸ a world-renowned search engine: www.google.com

⁹ Notability is a note-taking application for iOS and macOS. The application allows you to take notes and annotate PDF files.

¹⁰ X formerly known as Twitter is a social media platform where users can share short text, image and video updates.

¹¹ WordPress is a free content management system.

¹² Miro is an online collaboration platform from the US company RealtimeBoard, Inc.

Such creative activities facilitate the application of knowledge in innovative ways and the development of new solutions. In combination with the flipped classroom model (see chapter 3.5.7), the lower levels of the Taxonomy, Understanding and Remembering, are moved outside of the classroom, freeing up valuable class time for higher cognitive activities e.g. analyse, evaluate and create (Ouariach, Ouariach and Khaldi, 2024).

Integrating Bloom's Digital Taxonomy into the educational process offers numerous benefits. Not only does it promote the in-depth understanding and practical application of knowledge, but also the development of digital skills that are essential in today's world. Teachers can use this taxonomy to structure lessons that cover both traditional learning objectives and modern digital skills. This ensures that learners are optimally prepared for the challenges and opportunities of the digital future.

3.3.2 The SAMR Model

The SAMR model is often merged with Bloom's Digital Taxonomy as seen in Fig 6. The SAMR model, consisting of the stages Substitution, Augmentation, Modification and Redefinition, describes how technology can be used to transform the learning process (Nyayu, Heru and Masagus, 2019; Setiyawati, Basori and Efendi, 2023).

Bloom's Digital Taxonomy classifies cognitive skills as described above. By merging the two models, lecturers can make better use of technology in teaching while at the same time promoting cognitive skills. These frameworks can intersect in various ways across all levels.

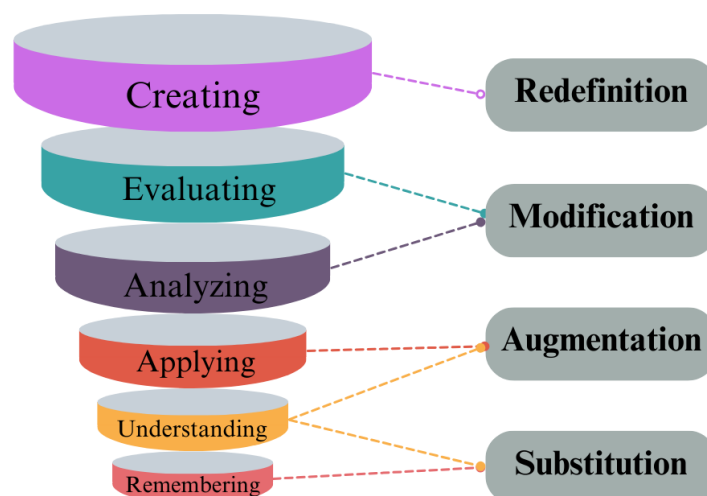


Figure 6 Connection between Blooms Taxonomy and the SAMR Model © Marlen Börngen

At the *substitution* stage of the SAMR model, technology replaces traditional tools without making major changes to the learning process. For example, at this stage, students can use a word processor instead of handwritten notes. While this often involves lower-order thinking skills like remembering and understanding, it can also support higher-order thinking when thoughtfully implemented. *Augmentation* adds functional improvements to the substitution. It involves improving the functionality of the technology in order to offer additional benefits. An example is the use of interactive e-books or learning apps that contain hyperlinks and multimedia content. These tools can support various levels of Bloom's Taxonomy, but mostly basic understanding to Applying. The next stage, *Modification*, allows for a significant reorganisation of the learning process. Here students could use collaboration tools such as Google Docs for group projects – it can mostly facilitate analysis, and evaluation, through peer editing and group projects. The highest level of the SAMR model, *Redefinition*, enables the creation of new tasks and projects that would not be possible without technology. An example of this is the creation of multimedia presentations or digital stories using tools like iMovie¹³. These activities can address multiple levels of Bloom's Taxonomy simultaneously, but mostly the creating level.

The key is that any SAMR level can potentially address any level of Bloom's Taxonomy. The effectiveness depends not on the technology itself, but on how it is implemented to achieve specific learning objectives. A simple substitution tool could support complex thinking, while a redefinition activity might focus on basic understanding (Puentedura, 2014).

3.3.3 Application example of Bloom's Digital Taxonomy and SAMR model

The integration of Bloom's Digital Taxonomy and the SAMR model into conservation practice offers a modern and comprehensive method for structuring learning processes and promoting student's digital skills. Whether consciously or unconsciously, teachers are already increasingly using the taxonomy levels in their teaching. This section uses a concrete example to show how the different levels of digital taxonomy can be applied in a paper conservation project.

A BA student in a paper conservation study programme works on the conservation of an etching from the 18th century. There are three other students in the same semester as the student who all have a similar object with the same damage pattern. The teacher is using

¹³ iMovie is Apple's free video editing software offering basic editing tools, transitions, and effects designed for users with minimal editing experience.

Bloom's Digital Taxonomy to organise the learning process and to ensure that students acquire both the theoretical and practical skills necessary for conservation.

The project begins with the research of basic information about the graphic such as the artist, printer or information about the paper. They use search engines to find relevant websites and save them as bookmarks for later access. They also read the literature provided in the lectures and highlight information in the text that is important for the conservation. This corresponds with the *remembering* stage in Bloom's Digital Taxonomy. At the *substitution* stage in the SAMR model, technology could be used to replace traditional tools. The use of digital databases instead of analogue archives or libraries would be an example of this. In this phase, basic facts and concepts are repeated by retrieving and noting down information. In the *understanding* phase, students complete a one-week printing workshop where they can try out various printing techniques for themselves. They record the results in their own words in a learning portfolio. They describe the typical characteristics of the printing technique. By making etchings themselves, they increase their understanding of their own conservation object. This also helps them to differentiate between damage to the object and marks resulting from the artist's process. In the spirit of *augmentation*, videos on individual printing techniques can also be viewed to further enhance the understanding of one's own work. Digital microscopes can also contribute to further understanding and documentation of the damage to the object. Students are then able to better understand and explain the structure of the print. In the next phase, *applying*, the students apply the knowledge they have previously acquired after instructions from the teacher and put it into practice. Further investigations such as microchemical analyses can be carried out on the paper. Based on this research and analysis, both the damage map and a conservation treatment proposal are developed. The first steps of conservation treatment are undertaken, such as dry cleaning, aqueous treatment and possibly infilling. As the objects are similar and have similar damage patterns but are not completely identical, it is important that the students share and discuss their results and progress with each other and with the teachers. This can be done in the sense of *modification* on platforms such as Trello¹⁴ or sciebo¹⁵ or by messaging via a messenger service such as Whatsapp. Image editing programmes such as Adobe Photoshop are used to create the damage mapping. In the *analysing* stage, the students examine the effectiveness of the conservation measures carried out. The students also evaluate the effectiveness of the selected conservation measures by comparing them against each other. This phase promotes critical

¹⁴ Trello is a Kanban-based online task management service from the company Atlassian.

¹⁵ Sciebo is a non-commercial file hosting service based on ownCloud for research, study and teaching. It enables the automatic synchronisation of data with different end devices and collaborative work on documents.

thinking and the ability to analyse and understand complex problems. During the *evaluating* stage, students critically discuss their results regarding the suitability and effectiveness of the various conservation methods and materials. The results are assessed and, if necessary, the conservation steps are adapted. Treatments that have already been implemented, such as infillings, can be reassessed and redone during this phase if necessary. The students give each other feedback, evaluate the proposed methods and discuss alternative approaches. This interaction promotes the ability to make informed judgements and consider different perspectives. Finally, in the *creating* stage, students independently find creative solutions to challenges that have arisen during the conservation. For example, this could be a gaping tear that needs to be moistened locally before it can be properly mended. The students film the conservation process or individual conservation steps or create animated presentations to make the conservation process accessible. This creative phase enables them to present their work in an innovative way and use digital media effectively. The highest level of the SAMR model, *Redefinition*, enables the creation of new tasks and projects that would not be possible without technology. It would be conceivable to transfer conservation ideas into virtual space. Students develop apps in which, for example, the change in the material is simulated under various environmental influences. The creation of virtual exhibitions is also possible. The redefinition phase is rarely used in the BA programme, as the main focus here is on learning the basics. In the MA programme, however, it is also possible to apply new technologies that support conservation, for example 3D scanning for artwork and Artificial Intelligence (AI) technology.

By using Bloom's Digital Taxonomy in this conservation project, students experience a structured and comprehensive learning process. As well as gaining specific conservation knowledge and skills, they will also develop important digital skills that are essential in the modern world. By integrating the SAMR model with Bloom's Digital Taxonomy in the subject area of conservation, lecturers can systematically increase the use of technology in the classroom while developing student's cognitive skills.

3.4 John Hattie's meta-analysis

John Hattie is a professor of Education and Director of the Melbourne Educational Research Institute at the University of Melbourne, Australia, since March 2011. He is known especially for his work on meta-analysis (Knowles, 1973, p. 42). The following chapter deals with a general introduction on John Hattie's study and methodology, as well as a discussion of the criticism of his work.

3.4.1 Introduction

In 2009 Hattie published his book "Visible Learning: A synthesis of over 800 meta-analyses relating to achievement" (Hattie, 2009), therein he publishes and analyses over 800 meta-analysis and 50.000 studies involving over 200 million students about various factors that contribute to student achievement like for example teaching strategies, assessment and feedback. It took 15 years to finish this meta-analysis. This massive study made him a prominent educational researcher and statistician receiving a lot of media attention at the time. The British magazine "Times Educational Supplement" describes his study even as "Holy Grail" (Mansell, 2008). It is still considered to be one of the most comprehensive studies of educational effectiveness and over the years the more data was included in this meta-analysis, 2017 it grew to 1400 meta-analysis, 80.000 studies involving 300 million students (Hattie and Zierer, 2020, p. 27). His ambitious goal was to find and analyse the key influence on how students are learning (Hattie *et al.*, 2013, p. 7). 2023 in his most recent book Visible Learning: The Sequel (Hattie, 2023) there are already 2100 meta-analyses included.

Looking closer at the term meta-analysis it should be pointed out that it was not invented by John Hattie. It was introduced 1976 by Gene Glass (2015), an American statistician who was also working in educational psychology. It is a statistical method where multiple empirical study results are forming an overall picture to get a better statement about the effect of a method or intervention - an analysis of analyses. Study results are converted into a common measure, the effect size. Then the overall effects can be quantified, interpreted, and compared, and the various variables of this overall effect can be revealed and examined in more detail (Hattie *et al.*, 2013, p. 3; Glass, 2015). Meta-Analysis don't give new data, the goal is to bundle several studies from a well explored research field, with numerous individual studies to get an overall result. In the 1980s the method became more widespread in use and subsequently also led to Hattie's publication.

He uses the method to sequence the effect sizes – from a very positive to a very negative effect in the performance of the students. Meta-analysis typically involves several steps (Sauerland and Seiler, 2005):

- Set the goal and hypothesis;
- Systematic search of the literature;
- Assessing the quality of the studies using predefined criteria;
- Extracting data from the studies, including study outcomes;
- Statistical analysis like the design of the study or heterogeneity;
- Sensitivity analysis;
- Interpreting the results and drawing conclusions.

Meta-analysis is a useful method especially in learning behaviour, because it allows researchers to combine data from multiple studies to identify the most robust and effective educational strategies. This can be especially useful when individual studies have small sample sizes or produce inconsistent results. By combining data from multiple studies, meta-analysis can provide a more accurate picture of the overall effectiveness (Zierer, 2014, p. 12). Hattie's work can be characterised by several key elements:

- He uses a large number of studies, which is why the results are more reliable.
- With the use of the effect size as an indicator of the magnitude of the effect, it allows for a more meaningful comparison of different interventions.
- Hattie's approach is evidence based and transparent.

In his meta-analyses, Hattie uses the effect size (d) as a statistical tool to quantitatively evaluate and compare individual studies. Effect size is a statistical measure that expresses the magnitude of the difference between two groups in standard deviation units. In the context of educational research, effect size is used to quantify the extent to which an intervention improves or worsens student learning. This allows a more meaningful comparison of the effectiveness of different interventions (Zierer, 2014, p. 13).

To calculate the effect size the following mathematical formula is used:

$$d = \frac{\text{performance increase (experimental group)} - \text{performance increase (control group)}}{\text{standard deviation}}$$

A positive value indicates an increase in academic performance, a negative value a decrease. Hattie's argues that this numerical value isn't meaningful enough for an interpretation, because learning can't be prevented, nearly everything based on the effect size has a positive effect. The zero point, meaning the average value of all effect sizes, was set at 0.4 instead of 0, with the goal being that a positive result would truly be above average. (Hattie and Zierer, 2020, p. 30). In Hattie's first work from 2009, the simplest way to calculate the average effect size for every factor was performed simply by determine the pooling effect sizes. After some critique about the fact that smaller meta-analysis were included in the same amount as bigger meta-analysis, now, as explained in the book "Visible Learning - Auf den Punkt gebracht" from 2020, the studies are weighted differently – on the number of individual studies, represented in the variable q (Hattie and Zierer, 2020, p. 31). In Fig. 7 a visible Learning barometer is illustrated using the effect "homework" with the effect size $d = 0,32$ and significance $q = 9,13$. In his synthesis of meta-analysis Hattie and Zierer defined nine domains into which all factors can be assigned and therefore systematised: Learners, parental home, school, classroom, curricula, teacher, teaching strategies, implementation and learning strategies (Hattie and Zierer, 2020, p. 32).

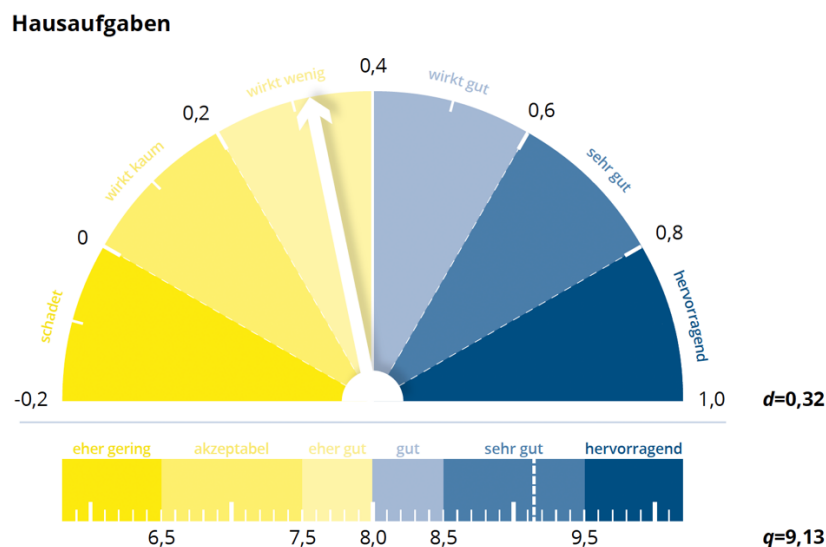


Figure 7 Barometer effect size d and significance q using the example of "homework" (© Hattie and Zierer, 2020)

The image of the didactic triangle (see Fig. 8) is often used here, where there is a balanced interaction between lecturer and student, student and material and lecturer and material. Also learning isn't happening in an empty space, the context in which learning and teaching is happening is reflected in a circle around the triangle (Berglund and Lister, 2010).

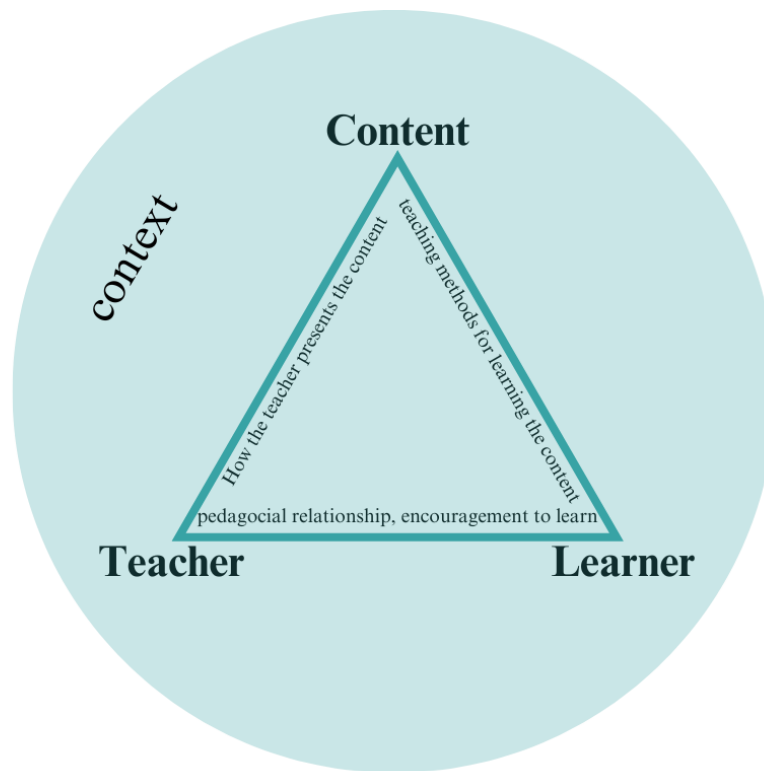


Figure 8 The Didactic Triangle with the connections between content, teacher and learner © Marlen Börngen

Hattie's great achievement was his emphasis on insight, that learning is demanding on both sides, teacher and student and requires a lot of effort (Zierer, 2020, p. 22). All these factors are in a constant interaction relation, where the area of teacher and curricula seems to have the greatest effect. Zierer stated clearly that the quality in teaching is at the most important. In 2023 Hattie's new books (Hattie, 2023) addresses was published and with that some changes were made. Q was replaced by the robustness index (R), which ranges from 1-5. It indicates how stable the effect size will be in the future, the higher the number, the more robust. Factors such as the number of available meta-analyses, the number of studies included in them, the number of students, the number of effects within the influence and the fail-safe number (Orwin, 1983) are taking into account. The Barometer was replaced by a Thermometer of impact for a more readable visual representation (see Fig. 9). Additionally, the domains in which Hattie categorised his influences have evolved to include: students, the home and family, school and society, classroom effects, the teacher, the curriculum, teaching with intent, learning strategies and teaching strategies.

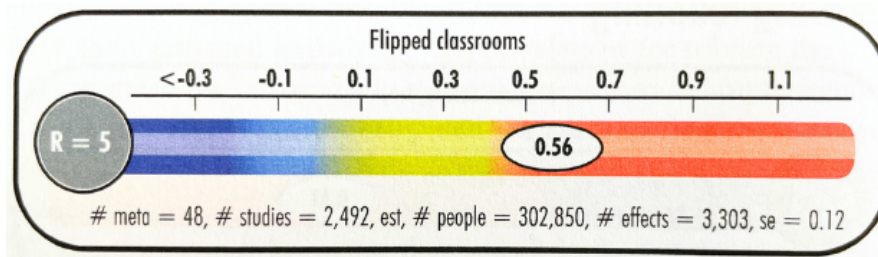


Figure 9 Thermometer of impact from Hattie using the example of “flipped classroom” (© Hattie, 2023, p. 374)

Hattie’s meta-analysis also must accept criticism on some points, although some criticisms are also voiced by Hattie himself. One of the main critiques of Hattie’s meta-analysis is its overreliance on effect size as a measure of effectiveness. The number of included studies is impressive, but the quality is sometime questionable (Terhart and Hattie, 2020, p. 15). Effect size is a statistical measure that indicates the magnitude of the difference between two groups. Hattie argues that effect size is a useful metric for comparing the effectiveness of different teaching methods and interventions. However, it may not give a complete picture. Effect size does not consider other important factors that may influence student achievements, such as the context of the learning environment, student characteristics, and the quality of instructions. Additionally, effect size, as mentioned before, can be misleading because it is often influenced by the sample size of the studies included in the meta-analysis. Small studies may produce larger effect size due to sampling error, while larger studies may produce smaller effect size due to the law of diminishing returns¹⁶. With the introduction of the significance q Hattie tries to counteract the last point, with studies with a high q carrying a higher scientific significance (Hattie and Zierer, 2020, p. 7). It is also viewed critically, that most meta-analyses originate in high-income countries, which might be misleading when it comes to comparison between the countries.

Another critique of Hattie’s meta-analysis is its lack of contextualisation. Critics argue that Hattie’s meta-analysis fails to consider the diversity of learners, teaching context and curricula. Hattie focuses on the effectiveness of teaching methods and interventions in general, without considering the specific needs and characteristics of different learners or the specific context in which teaching and learning occur. Critics argue that this lack of contextualisation limits the generalisability and applicability of Hattie’s finding.

¹⁶ The Law of Diminishing Returns states that the additional benefit or return received from an additional unit of an input decreases as the use of that input increases (Gillis *et al.*, 2024). In the context of the Hattie study this concept is criticised as it suggests that not all interventions remain equally effective with continued use. Critics argue that the study does not take sufficient account of the fact that repeated use of the same educational method can reduce its effectiveness over time.

Having an overview of all the studies may result in a neglect of important details and vice versa (Terhart and Hattie, 2020, p. 41). Critics have also raised concerns about the methodology limitations of Hattie's meta-analysis. Some critics argue that Hattie's meta-analysis includes studies with varying levels of quality, which may bias the result. Additionally, some critics argue that Hattie's meta-analysis may suffer from publication bias, as studies with positive results are more likely to be published than studies with negative results (Terhart and Hattie, 2020, pp. 42–43). Critics also point out that Hattie's meta-analysis does not include studies that are not published in English, which may limit the scope and diversity of the studies included. Additionally, critics argue that Hattie's meta-analysis does not provide a clear explanation of the criteria used to select the studies included in the analysis (Hattie and Zierer, 2020, p. 8).

Even if the criticisms of Hattie's study sound manifold, it gives a first indicator for learning and teaching scenarios that can work in practical application and thus give lecturers a good support. The practical implementation is left up to the lecturers. Therefore, an attempt is made to transfer some teaching/learning scenarios that work well according to Hattie's study to conservation education in chapter 4 and 5. Some scenarios that are already practiced in the field are also included. The Website: <https://www.visiblelearningmetax.com> (accessed 19.07.2024) provides the latest effect sizes in the various domains.

3.4.2 The meta-analysis at universities

Most meta-analysis in Hattie's summary focus in teaching and learning in schools, but there is also analysis which are in the university context. For example, the article from the Zurich School of Applied Sciences, School of Management and Law (SML) (Lübcke, Müller Werder and Johnner, 2015) summarises the following key messages for university teaching, based on Hattie's meta-analysis. Learning goals are one of the important factors and this should be as transparent as possible. For the student it should be clear when and how the learning goal is reached. Feedback is another essential element in the learning process, whether it comes from colleagues, students or the literature. This requires an open and trustworthy interaction between teacher and student.

There is surface knowledge¹⁷ and deep knowledge¹⁸, and both are needed in building conceptional knowledge and should focus to achieve success in learning. And at last, teaching methods should be always appropriate in the situation and be used in a reflected manner. In Hattie's article about "Teacher-Ready Research Review: The Applicability of Visible Learning to Higher Education." (Hattie, 2015), Hattie reflects the key results from his meta-analysis in context to universities. With an effect size of 0,91, both the evaluation of the learning success and the cooperation of the teacher plays a huge role. Other important factors are the alignment with learner's prior knowledge (d=0,85); transparency of expectations for learners (d=0,77); Learning material in a balanced ratio between surface knowledge and deep knowledge (d=0,71). Hattie also states provocatively that: "method does not matter" (Hattie, 2015, p. 86). Thus, depending on the method, most successful teaching methods appear to have certain key characteristics in common such as: teachers should work transparently, take the students previous experiences into account, adjusted challenge level, feedback, constructive alignment in exams and trusting relationship with students but also among students.

3.5 Modern Teaching and Learning methods in the 21st century

In the 21st century, the field of conservation education has seen a significant shift towards more innovative and student-centred teaching and learning methods. This approach is supposed to help to prepare the students more effectively for the challenges in the future working environment by fostering critical thinking for example. This chapter explores ten such methods, including Active Learning, Activity-Based Learning, Bite-sized Learning, Blended Learning, E-learning, Experiential Learning, Flipped Classroom, Lifelong Learning, Open Educational Resources, and Problem-Based Learning. As this chapter will show, each method has his advantages and disadvantages. Insights from some of Hattie's influences are shown as well as how these methods may apply to the conservation field, providing practical examples and case studies to illustrate their effectiveness.

¹⁷ Surface knowledge refers to the basic understanding of a topic where facts and information are retained at a rather shallow level, without deeper analysis or critical thinking. This knowledge is often sufficient to answer simple questions or perform standard tasks but does not provide a basis for deep understanding or the ability to solve complex problems (Dolmans *et al.*, 2016).

¹⁸ deep knowledge refers to a comprehensive understanding and the ability to recognise and analyse complex relationships and details of a specific topic. It includes the ability to critically evaluate information and apply it in different contexts. Deep knowledge goes beyond mere memorisation of facts and promotes deeper understanding and problem-solving skills (Dolmans *et al.*, 2016).

3.5.1 Active Learning (AL)

The term *Active Learning* generally describes the act of integrating students more actively into the learning process. The Greenwood Dictionary of Education provides a detailed description:

„Active Learning. The process of having students engage in some activity that forces them to reflect upon ideas and how they are using those ideas. Requiring students to regularly assess their own degree of understanding and skill at handling concepts of problems in a particular discipline. The attainment of knowledge by participating or contributing. The process of keeping students mentally, and often physically, active in their learning through activities that involve them in gathering information, thinking, and problem solving.” (Collins and O’Brien, 2003, p. 6). Constructivist learning theory can be seen as the basis for active learning, in which learners build and expand knowledge by linking it to existing knowledge and experiences. This is exactly where AL comes in, as learners are encouraged to use this approach to create connections between new information and existing thought patterns (Brame, 2019).

There are various approaches to AL:

Think-pair share: A problem/question is presented, and students work on it individually for short time, then the solutions are discussed and improved in groups of two, after which the results are presented.

Concept test: Multiple choice questions are asked, students answer using a clicker system, for example Mentimeter¹⁹, the answers are discussed and analysed in small groups or in a larger group.

Minute papers: Students write for one minute on a question that requires them to reflect on and critically scrutinise what they have learned so far. The answers are discussed in the group (Brame, 2019; Felder and Brent, 2009).

These techniques incorporate essential factors identified in John Hattie’s meta-analysis, including Feedback, Collaborative Learning, and Meta-Cognition strategies.

Feedback is one of the most researched influences with high impact, evidenced by an effect size of 0.51 and a robustness factor of 4 (*Visible Learning - Feedback Details*, no date).

¹⁹ Mentimeter is a web-based interactive presentation platform developed in Stockholm, Sweden. The tool enables real-time audience engagement through features like polls, quizzes, word clouds, and Q&A sessions, allowing participants to contribute anonymously via their mobile devices or web browsers. (<https://www.mentimeter.com/de-DE>)

Hattie defines Feedback as “*information provided by an agent (e.g., teacher, peer, book, parent, self, experience) regarding aspects of one’s performance or understanding*” (Hattie and Timperley, 2007, p. 81). The goal of feedback is to reduce the discrepancy between current performance and intended goals, and it can be provided on four levels: task, process, self-regulation, and self (Hattie and Zierer, 2020). Effective feedback is clear, specific, timely, and actionable. It should address learning, not personal characteristics, and encourage reflection and improvement of learning strategies. Good feedback involves asking: Where am I going? (Feed Up), Where am I now? (Feed Back), and how am I moving forward? (Feed Forward). These questions help identify learning goals, current status, and next steps, fostering a complex dialogue between teacher and learner (Hattie and Zierer, 2020, p. 90). Incorporating these elements into AL techniques ensures deeper engagement and effective learning, aligning with higher levels of Bloom’s Taxonomy, such as Analysing, Evaluating, and Creating.

Collaborative Learning with an effect size of 0.45 and a robustness factor of 4 (*Visible Learning - Collaborative learning Details*, no date) has also the potential to help students in their learning achievements and is a powerful strategy within the framework of AL. In an AL setting, collaborative learning involves students working together in pairs or small groups to solve problems, discuss concepts, and develop new ideas. This method leverages the collective knowledge and skills of the group, fostering a deeper understanding through dialogue and shared insights which aligns with Bloom Taxonomy at the level Analysing, Evaluating and Creating, but also promotes key social skills such as communication, teamwork, and conflict resolution.

In Hattie’s meta-analysis *Meta-Cognition Strategies* is identified as having a good impact on students learning progress, with an effect size of 0.52 and a robustness index of 5 (*Visible Learning - Meta-cognition strategies Details*, no date). These strategies involve student’s awareness and control over their own learning processes, which include planning, monitoring, and evaluating their understanding and performance (Hischier, 2017). In the context of AL, meta-cognitive strategies encourage students to become more self-regulated learners. This involves setting specific learning goals, selecting appropriate strategies to achieve those goals, and reflecting on the effectiveness of these strategies. The research shows that when students are taught to use meta-cognitive strategies, they are better equipped to tackle complex tasks, solve problems more effectively, and transfer skills to new contexts – key components of the higher levels of Bloom’s Taxonomy.

As an example, from the conservation study programme Pingo Coactum²⁰ is used as a classroom-response-system for anonymous knowledge assessment and is particularly useful in preparation for examinations. The multiple-choice answers can be infused with humor, creating a more relaxed teaching environment. While this assessment method doesn't necessarily require grading, it remains effective in reinforcement knowledge and boosting group motivation. The questions are designed by the teacher and can be adapted to the respective situation. The results of the questions can then be discussed in the group and the teacher gives feedback on the answers. Some questions may lead to discussions among the students which contributes to Collaborative Learning. It is also possible to reverse the principle by having students come up with questions that are then incorporated into the lesson. This provides another level of cognitive anchoring (Pataki-Hundt and Börngen, 2024).

3.5.2 Activity Based Learning (ABL)

Activity-Based Learning (ABL) prioritises hands-on experience in a dynamic learning environment over passive learning. Learning by doing is the core of ABL such as conducting experiments (Rennie, Smyth and Mason, 2020, p. 10). By doing so, students can link theory and practice and hence making learning more meaningful. For example, a chemistry class where students do self-guided experiments would be an ideal situation for this approach. In an ABL classroom, group activities, discussions, and collaborative projects are common features. These interactions support the development of critical thinking and problem-solving skills in students as they navigate tasks. The teacher in this setting assumes a coaching role, providing assistance when necessary. The student-centred nature of ABL means that the focus is on the learners and their active participation. Each student takes a central role in their educational experience, which promotes a sense of ownership and responsibility for their learning. Feedback from peers and teachers provides valuable insights that can guide students learning journey. This continuous cycle of action, feedback, and reflection helps students to learn from their mistakes and successes, promoting continuous improvement. An essential factor in this approach is the teacher-student relationship. According to John Hattie, the quality of the teacher-student relationship has a significant impact on learning outcomes, with an effect size of 0.62 and a robustness index of 5 (*Visible Learning - Teacher-student relationships Details*, no date). In an ABL environment, the teachers as a coach and facilitator fosters a supportive

²⁰ PINGO is a web-based voting system for activating learners. It is an acronym for "Peer Instruction" and was developed at Paderborn University in the early 2010s as a live feedback system for teaching. <https://pingo.coactum.de>

and trusting relationship. This relationship is crucial for creating a positive learning atmosphere where students feel comfortable taking risks, asking questions, and seeking help when needed. It is, however, also possible that ABL may result in a cognitive overload for students. For instance, the “learning by teaching” approach may overwhelm students if the content is too complex, resulting in minimal learning benefits (Skulmowski, 2024).

The study of conservation is inherently activity-based, where theoretical knowledge gained during lectures is regularly applied to the practical work on semester objects. This approach can be supported by watching video tutorials (see chapter 4.1.4 and 5.1.2). Let’s take skiving of leather for a leather infilling on a book cover as an example. Video tutorials teach the theoretical and practical basics. In addition, the skiving of leather is demonstrated in practice. After some practice the students will then be able to carry out the leather skiving process independently. If students have any questions, they can contact their lecturers or fellow students from their own or higher semesters. The independent exploration of a topic strengthens motivation and problem-solving skills.

3.5.3 Bite-sized Learning (BSL)

Bite-sized learning (BSL) is an educational approach that breaks down complex information into smaller, easily digestible chunks. It is a method that considers the current circumstances where information overload and distractions are common. This approach is both pedagogically and pragmatically advantageous. The core principle of BSL is simplicity. By distilling information into its most essential elements, learners can focus on one key concept at a time, making it easier to understand and remember the learning material (Mazlan *et al.*, 2023). For example, instead of presenting a lengthy lecture on a broad topic, a teacher might create a series of short videos, each covering a specific aspect of the subject. This modular format allows learners to tackle one piece of information at a time, reducing cognitive load and preventing the feeling of being overwhelmed. Flexibility is another significant advantage of BSL with videos. Learners can access content at their own pace and according to their own schedule. This is particularly beneficial for adult learners and professionals. BSL supports ongoing education by making it easy to incorporate learning into daily life (Koh, Gottipati and Shankaraman, 2018). It encourages a habit of lifelong learning, where individuals continuously seek out and consume small units of knowledge to stay current and enhance their competencies. Incorporating self-assessment into the BSL approach further enhances its

effectiveness. John Hattie identifies self-assessment – referred to as “self-reported grades”, with an effect size of 0.96 and a robustness factor of 3 (*Visible Learning - Self-reported grades Details*, no date). According to Hattie, self-assessment isn’t about the accuracy of students performance reflections but their opportunity to “predict their performance” (Hattie, 2012, p. 60). This involves making success criteria clear, setting high yet appropriate expectations, and providing timely feedback.

Breaking down a complex conservation task into several smaller units has many advantages for the students. Particularly in the BA programme, the conservation of an original object can be overwhelming for students, especially at the beginning. The fear of making mistakes, which can sometimes be irreversible in conservation, is very great. For this reason, the practical part of the programme takes the approach of dividing object conservation into smaller portions. For example, in the semester with the topic of book and leather conservation, conservation is divided into portions such as dry cleaning, re-stitching broken sewing supports and endbands, making spine former, skiving leather or leather infilling. Short video tutorials, which students watch in advance to prepare, complement this process (see chapter 5.1.2). Self-assessment integrated into BSL are beneficial for the student learning effect. For instance, after watching a short tutorial video or completing a segment of a conservation treatment, students can assess their understanding and progress, predicting their performance based on clear criteria and feedback. This practice not only enhances their engagement but also promotes a deeper understanding of the material.

3.5.4 Blended Learning (BL)

Blended learning (BL) has become something of a buzzword at universities in recent years, partly due to the COVID-19 pandemic. But of course, there were BL methods used in teaching long before that. BL combines online and in-person methods. It merges classroom experiences with digital tools. This approach uses both synchronous and asynchronous online activities along with face-to-face teaching. Technology plays a key role, with platforms like Learning Management Systems (LMS) and other digital resources like Zoom²¹. This approach fosters student independence and self-directed learning (Li *et al.*, 2021). Teachers can focus more on collaborative activities and interactive communication. Digital tools like videos or

²¹ Zoom is a video telephony software programme. This makes it possible to hold webinars with many listeners. The software also offers several other additional functions such as the possibility of break out rooms.

quizzes enhance engagement from the students. Implementing BL requires careful planning as not all content is suitable for this approach. Teachers must prepare materials for virtual classrooms which can be time-consuming. Simply transferring classroom material into an online setting is not enough. Digital Bloom's taxonomy guides this transition process with comprehensive support. Teachers take on a more coach-like role, offering help and guidance during both online and offline lectures. There are also some critique points about BL. Some students might feel they lack support or structured learning. This can impact their engagement and learning outcomes. Teachers must provide adequate guidance and structure to counteract this (Hazelkorn and Locke, 2021).

Based on Hattie's meta-analysis one significant influence that fits well with Blended Learning is Teacher Credibility, effect size 1.09, and a robustness index of 2 (*Visible Learning - Teacher Credibility Details*, no date). Teacher credibility plays a crucial role in both online and in-person settings and is vital for the success of blended learning environments. In a blended learning environment, maintaining credibility is crucial as it directly impacts student engagement and motivation. For instance, teachers can build credibility by being consistently present, whether through in-person discussions or interactive video sessions. This helps in fostering a reliable and trustworthy learning environment, which is particularly important in the less structured online setting (Finn *et al.*, 2009).

BL is also used in conservation study programmes. Theoretical lectures are sometimes given online, although on a much smaller scale than during the pandemic. The possibilities of hybrid courses are also used, especially by external lecturers. During the pandemic, the semester that dealt with the topic of book and leather conservation was held online, supported by video tutorials. This setup enabled students to practice bookbinding techniques, like conservation bindings, from home. Once circumstances permitted, practical sessions resumed in person, focusing on the original objects. The teachers were always available via Zoom or telephone. The pandemic was one of the reasons why several video tutorials in paper conservation were created, as described in chapter 4. Teacher credibility in these scenarios was crucial, as it reassured students and ensured continuous guidance and support, whether the interaction was virtual or in person.

3.5.5 E-learning

E-learning is defined as a form of learning that occurs using digital platforms, online learning or virtual learning are some synonyms. The internet is employed as a vehicle for the delivery of educational content. However, since the “e” in “e-learning” stands for “electronic”, the term can be understood more broadly. This includes not only learning that takes place via the internet but also learning that takes place via stand-alone devices. M-learning or Mobile learning is a sub-form of e-learning where the learner uses portable devices. This method enables students access their learning material from any location. All that is required is a device and internet access (Chitra and Raj, 2018).

E-learning includes a multitude of formats, like online courses, webinars, and virtual classrooms. This learning method provides a high degree of flexibility, allowing students to seamlessly integrate their studies into their daily schedules. This is especially advantageous for those who are working while pursuing a distance learning programme.

An essential element of successful e-learning is Self-Regulation, one of Hattie’s influences with an effect size of 0.51 and a robustness index of 5 (*Visible Learning - Self-regulation strategies Details*, no date). Self-regulation refers to the ability of students to manage their own learning processes, like setting goals or reflecting on their learning outcomes. In an e-learning environment, where face-to-face interaction is limited, self-regulation becomes crucial. Students need to have a high degree of self-discipline and motivation to manage their schedules, engage with the content, and complete their assignments independently (Götz *et al.*, 2011). Teachers play an important role in e-learning. They create and disseminate digital content and give feedback via email or a digital learning platform. E-learning offers several advantages, including reduced travel time, the ability to revisit modules multiple times, and significant flexibility for learners – arguably one of the greatest benefits. Nevertheless, e-learning is not without its challenges. It is not a giving that all students have reliable internet access, especially in developing or emerging countries. It is possible that some students may experience feelings of isolation in the absence of in-person interaction. The capacity for self-discipline is a key factor in determining success (Bremer, Krömker, and Gesellschaft für Medien in der Wissenschaft, 2013).

An example of e-learning in conservation is the module on conservation published by Landschaftsverband Rheinland (LVR)²². This tool involved collaboration among archive staff from Belgium, Germany, Luxembourg, and the Netherlands.

²² <https://bestandserhaltung.eu> (accessed 04.01.2025).

The modules can be completed independently of each other and are available as Open Educational Resources (OER) (see chapter 3.5.9). They cover topics such as emergency procedures, dealing with damaged records, mould and personal safety. This is also a good resource for students during their studies.

3.5.6 Experiential Learning (EL)

Experiential learning is learning by doing as it is in Activity Based Learning, but EL has a broader approach by focusing on real-world problems. It involves direct experience and reflection. This approach involves practical work where students perform activities in order to learn, such as internships, field trips, simulations among others (Rennie, Smyth and Mason, 2020, p. 66). In real-life situations, learners put theories into practice. This eliminates the gap between theory and practice. A crucial aspect of experiential learning is the reflection on one's actions. After completing an activity, students take time to consider their experiences, reflecting on what they have learned and its applications. This process fosters a deeper understanding of the material. Students develop problem-solving and critical thinking abilities. They gain teamwork and communication skills. These are valuable in both academic and professional settings. This method increases engagement. Students are active participants in their learning. However, experiential learning has challenges. It requires resources like time and money. Organising activities can be complex. It needs careful planning and support (*Experiential Learning | Center for Teaching & Learning*, no date).

During the CICS study programme, students are required to complete a mandatory internship or an Erasmus term in their fourth semester. They work in conservation labs in museum, libraries or archives, or in a freelance studio. During this time the theoretical knowledge they acquired in their studies is applied in practice. Students are given an insight into the real-life challenges that await them once they enter the workforce. They are working in a team of conservators and other staff members and have to integrate themselves into a team. After this semester the students come back more mature and sometimes with ideas for their BA thesis. Mentoring is one part of this internships, Mentoring is also mentioned by Hattie, with an effect size of 0.18 and a robustness index of 3 (*Visible Learning - Mentoring Details*, no date). This may sound not much in comparison to the other influences mentioned, but in the context of conservation, Mentoring from senior conservators at the internship position and the teachers at the university are important. The Learning curve significantly improves during this

time. As part of the examination, students give a presentation to all students in the degree programme. The younger semesters are also shown where they can do an internship. Another example at CICS is the conservation field trip to the Auschwitz-Birkenau State Museum. BA students have the possibility to do an internship at the conservation department of the museum. No conservation theory at the university could prepare the students for this real-life experience in this meaningful place (Heritage, 2024).

3.5.7 Flipped Classroom, Flipped Lab

A flipped classroom reverses traditional learning settings. Traditional models often use rote memorisation and passive learning, which may not suit to the diverse learning styles of all students. Flipped Classroom is more student-centred approach rather than a teacher-centred education. Students learn new content at home by often watching lecture videos. In contrast to traditional “homework”, tasks are then completed in the classroom. This shift allows for more interactive and hands-on learning experiences during class time. Teachers play a guiding role. They facilitate discussions and activities. They provide feedback and support. Flipped classroom setting normally have a pre-class, an in-class and a post-class phase. The pre-class phase involves students engaging with learning materials independently, ensuring they come to class prepared. The in-class phase focuses on consolidating this knowledge through interactive and collaborative activities. Finally, the post-class phase involves applying the acquired knowledge to real-world scenarios, further solidifying the learning (Ouariach, Ouariach and Khaldi, 2024).

This model also promotes active learning, critical thinking, and problem-solving skills because students are asked to be active participants which leads to better understanding and retention. Like every model flipped classroom have also some challenges. One significant challenge is ensuring that all students have access to the necessary technology and internet connectivity to participate in online learning. Additionally, creating sufficient and high-quality content to meet the diverse needs of students can be time-consuming for teachers. There is also the risk that less motivated students may struggle to keep up with the material independently, leading to gaps in knowledge and understanding. Also some study have shown that the flipped classroom model may be effective for certain types of learning, it may not fully address the needs for developing complex competencies (Hernández-Sabaté *et al.*, 2024).

Flipped Classroom is also mentioned in Hattie's influences with an effect size of 0.56 and a robustness index of 5 (*Visible Learning - Flipped Classroom Details*, no date), indicating a positive effect on student learning outcome.

At the TH Köln Professor Burdinski established the Flipped Lab model for basic scientific internships in this case "inorganic chemistry" (Burdinski and Glaeser, 2016). The traditional lab setup posed significant challenges for both students and teachers, including long wait times, inadequate preparation, and low acceptance of entrance exams. Additionally, high dropout rates in science programmes, often due to performance issues and lack of motivation, were a concern. The Flipped Lab model is inspired by the Flipped Classroom approach, which shifts the focus from in-class lectures to online learning materials such as video tutorials. Students prepare extensively for lab sessions by engaging with these online resources and completing electronic tests, which ensures they are well-prepared and can make the most of their lab time. This preparation not only improves the quality and safety of the experiments but also enhances the overall learning experience. The use of videos and online tests has been particularly well-received by the students, as it aligns with the digital learning preferences of younger students. The model has also allowed for an increase in lab capacity without compromising the quality of instruction, making it a scalable solution for large cohorts. More about the Flipped Classroom/Lab approach in conservation is given in chapter 5.1.2.

3.5.8 Lifelong Learning

Lifelong learning is a very broad term, and it is basically the ongoing pursuit of knowledge and updating of abilities beyond formal education from early-childhood through post-retirement. It is voluntary and self-motivated, aimed at personal and professional development. The concept of lifelong learning is not new and has been promoted by organisations like the UNESCO²³ or the European Union (EU). It involves learning throughout one's lifespan, using diverse teaching methods, and shifting the focus from learning content to learning processes. It also stresses the intrinsic value of education and the recognition of learning in various settings beyond traditional educational institutions (Alla, 2024). Self-efficacy, with an effect size of 0.65 and a robustness index of 5 in Hattie's analysis (*Visible Learning - Self-efficacy Details*, no date), is a key factor in lifelong learning. Believing in one's ability to learn and succeed fosters the confidence to pursue learning opportunities.

²³ UNESCO Institute for Lifelong Learning: <https://www.uil.unesco.org/en> (accessed 04.01.2025).

Individuals engage in lifelong learning for various reasons. Some seek personal growth and fulfilment. Others aim to stay competitive in their careers. The motivation can be curiosity, career advancement, or adapting to changes. Lifelong learning includes formal and informal methods. It can happen in classrooms, online, or through self-study. Reading books, attending workshops, and taking online courses are only a few examples. Learning from experiences and interactions is also part of this learning method (Rennie, Smyth and Mason, 2020, pp. 93–97).

Lifelong Learning in conservation is often reflected through workshops to further professional development. One example is the Centro de bel libro in Ascona²⁴, which offers recurring courses on book conservation. But also, other institutions like ICCROM or freelancers offer workshops.

3.5.9 Open Educational Resources (OER)

Open Educational Resources (OER) are freely accessible teaching and learning materials. These resources are available to anyone for use, adaptation, and distribution depending on the license mentioned on the resources. Fig. 10 shows the licenses from “very open” (green) to “closed” (red).

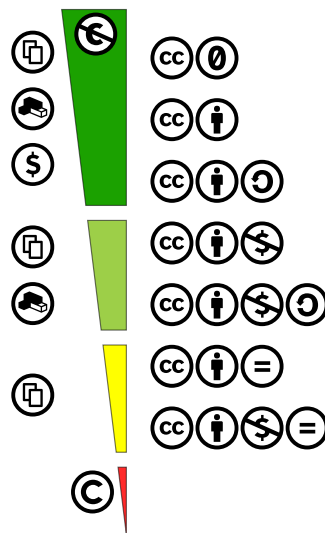


Figure 10 original CC license symbols by Creative Commons © Shaddim -

<https://creativecommons.org/about/downloads>/[https://creativecommons.org/policies/Original CC license icons](https://creativecommons.org/policies/Original%20CC%20license%20icons)
 licensed under CC BY 4.0, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=47247325>.

²⁴ <https://www.cbl-ascona.ch/en/programm> (accessed 01.01.2025).

For example, the often-used license CC-BY-SA means that these materials may be modified, distributed and used under the same license, provided the author is named. OER can include textbooks, course materials, videos, tests or software. OER aim to make education more accessible by reducing the costs for the students but also for teachers (Tandel, 2024). But for the authors creating such OER could involve a great deal of personnel and financial expenditure. The objective of OER is to facilitate innovation and flexibility in teaching methods and materials by diversifying the range of teaching materials available and providing support to teachers in their use of these materials. Many universities and schools incorporate OER into their programmes and support creating OER.

A great resource for OER in conservation is the Conservation Wiki²⁵ (or AIC Wiki), sponsored by the American Institute of Conservation (AIC). It started in 1985 in a print format and has been converted to an online wiki format. The content often comes from the AIC Specialty Groups, which also maintain the AIC Conservation Catalogues, a great resource for conservation materials and techniques.

3.5.10 Problem Based Learning (PBL)

Problem-Based Learning (PBL) has emerged as an educational strategy that addresses the needs of 21st century learners in the context of the internet, which provides students with an abundance of knowledge. The underlying premise is that students learn by engaging with complex issues without prior instruction. This approach encourages the development of critical thinking and problem-solving abilities (Taningrum *et al.*, 2024). Students are presented with a problem and must identify the knowledge they require to solve it. This process entails the investigation, discussion, and application of knowledge. Lecturers act as facilitators, rather than direct instructors. This approach to Problem-Based Learning (PBL) focus on student-centred learning, whereby students develop self-directed learning skills and must think creatively and critically. Furthermore, it often involves an interdisciplinary approach. Once the problem has been solved, students are encouraged to reflect on the learning that has taken place. This process helps them to apply their newfound knowledge to future problems and deepens their understanding. PBL in Hattie's analysis has a relative low impact of 0.45 and a robustness index of 5 (*Visible Learning - Problem-based learning Details*, no date), but the number maybe a little deceiving here. Since the term is so broad many of the components of PBL can have a positive effect on student's achievement like the

²⁵ https://www.conservation-wiki.com/wiki/Main_Page (accessed 01.01.2025).

feedback mentioned before. It's also important to note that PBL is not a monolithic approach. The effectiveness of PBL can vary depending on factors such as the quality of project design and the level of teacher support (Gijbels *et al.*, 2005). The implementation of PBL requires careful planning on the part of educators. In an article from Wang (2024) PBL in an Blended Learning environment is evaluated, Blended Problem-based learning (BPBL), where the more active part of PBL merges with the flexibility of BL.

PBL in conservation often takes part in higher semester when students have a robust basis in theoretical knowledge in conservation. This is usually felt for the first time during the bachelor's thesis. Most of the time it is project-based on the paper conservation degree programme, which means that students have a practical object to work on. They are confronted with a conservation problem where they must find solutions independently. Lecturers provide assistance during this time, but students are expected to carry out the work independently. This includes researching the literature, formulating the research question, developing a concept, carrying out possible test series and the actual conservation on the object and critical reflection after finishing the project.

4 The “Jigsaw Teaching Project” – Video Tutorials in Paper Conservation Education

One of the core research questions of this dissertation – “What role can video tutorials play in the education of paper conservators?” is addressed through the “Jigsaw Teaching Project” from 2022/2023 at CICS. This chapter will present the theoretical potential of video tutorials, as well as their practical implementation and impact in the field of conservation education. While extant literature has established the general effectiveness of innovative approaches in cultural heritage conservation and digital teaching methodologies in general (see chapters 2 and 3), this research examines their application in the field of paper conservation. It explores the definition and effectiveness of video tutorials in improving learning outcomes, the pedagogical strategies involved in creating effective videos, and the integration of this medium into the paper conservation curriculum.

The project emerges from recognising significant gaps in traditional conservation education methods. Staff shortages and ever-increasing self-administration at universities make it difficult to teach all relevant conservation subjects in these three years of the Bachelor’s degree programme. A circumstance that leads to compromises in the number of topics that can be taught, especially in a demanding degree programme such as conservation and restoration with a high practical component. This might affect the learning outcome of the students. A particular challenge is the demonstration of hands-on techniques that are fundamental to paper conservation practice but often difficult to capture through conventional teaching approaches. Practical conservation methods are mostly taught by having a lecturer or older students demonstrate them. Video tutorials offer unique capabilities for conservation education that traditional methods cannot match. The medium’s ability to show fine motor movements in detail, to be paused and replayed at critical moments and later on, and to capture techniques from multiple angles provides advantages for demonstrating and therefore help the students to strengthen their conservation skills. This research explores approaches that elevate conservation videos beyond what is commonly found on platforms like YouTube. While CICS (particularly the paper conservation department) has successfully incorporated videos from other sources to enrich theoretical lectures, such as demonstrations of industrial leather production, the field faces two significant challenges: the scarcity of high-quality conservation-specific tutorials and the spread of unreliable content online. Creating effective conservation video tutorials requires a careful balance of technical and pedagogical considerations.

In 2022, the foundation Innovation in Higher Education (Stiftung Innovation in der Hochschullehre, StiL) launched a call for proposals under the name “Freiraum 22”. In the context of the evolving educational landscape, its objective was to empower educators and academic institutions by supplying them with essential resources to develop and test out experimental teaching concepts (Stiftung Innovation in der Hochschullehre, 2022). The study programme Conservation and Restoration of Documents, Graphics, Photography and Book Illumination at CICS was successful in its proposal and initiated a project with the title “Rethought! – Jigsaw Teaching in Conservation-Restoration”, which spanned 17 months. The Jigsaw-Teaching Approach employs the metaphor of the jigsaw puzzle to describe its educational approach. Just as a jigsaw puzzle is composed of interlocking pieces, the project divides the conservation curriculum into distinct, modular units also known as video tutorials, which corresponds with the method of bite-size-learning (see chapter 3.5.3). These units may include basic practical applications, theoretical insights, or specific conservation techniques. Students are afforded the opportunity to assemble these educational “pieces” in various orders, according to their individual learning needs and interests. This approach is analogous to the way puzzle pieces are assembled in a non-fixed sequence. At CICS, the Bachelor semesters are divided into different topics, including graphic conservation, leather and book conservation, and parchment conservation. By breaking down these challenging and extensive semester topics into smaller units, the objective is to provide students with a more manageable and digestible approach to the semester content, particularly in practical conservation work. In a jigsaw puzzle, each piece is essential to completing the overall picture; similarly, each learning module is designed to be part of a comprehensive educational experience. When put together, these modules provide an interconnected understanding of the curriculum in the Bachelor programme, tailored to the unique educational landscape of the students. Working on a jigsaw puzzle can be a collaborative effort, where different perspectives help in solving the puzzle more efficiently. Topics are often taught to several semesters at the same time. On the one hand, this helps to pool resources, but it also allows students to network and learn from each other. The project encourages collaboration among students, educators, and conservation professionals. This collaborative effort not only enhances learning outcomes but also mirrors the real-world scenarios where multiple experts come together to solve conservation challenges.

4.1 Data Collection and Implementation

To investigate the effectiveness and optimal design of video tutorials in paper conservation education, a carefully designed questionnaire was administered to conservation students to establish a basic understanding of the student's background, to assess their knowledge in conservation, and to identify their reluctance to ask questions about conservation methods during lectures. The comprehensive survey data provided insights into student needs and learning preferences, which subsequently shaped the initial design and content selection for the video tutorials. It was designed to capture their preferences regarding the content, duration, and design of the tutorials to determine the most appropriate approach for the project. The questions included in the survey were developed in collaboration with student assistants with the objective of enhancing participation and transparency within the project. Based on the survey results, the research team identified key areas where video tutorials could have the greatest impact during the content design phase. The content development process was based on the principle that learning should be modular, flexible and student-centred, with specific design principles developed to address the unique needs of conservation education. The research design included the development and implementation through the “Jigsaw Teaching” approach and subsequent evaluation. A unique aspect of the data collection and content creation stage was its collaborative methodology. The project team consisted of conservators, a professional film crew from the media office at the TH Köln, a graphic designer, and importantly, students themselves. Students participated in every phase, from content selection to the production of YouTube shorts. This inclusive approach not only ensured the relevance of the content but also empowered students by giving them a voice in their educational materials. The research presented here helps to fill significant gaps in the conservation education literature where video-based learning has been under-researched, even if there are numerous videos on YouTube on conservation methods and have considerable potential benefits for teaching complex conservation methods. By systematically collecting data on student needs, implementing tailored solutions and evaluating outcomes, this research provides a basis for understanding how video tutorials can enhance paper conservation education.

4.1.1 Initial survey among the conservation students

The project was primarily designed for Bachelor students, but the survey²⁶ was open to all students enrolled in the Conservation and Restoration of Documents, Graphics, Photography and Book Illumination degree programme. The survey was voluntary. All questions were open-ended, i.e. no pre-defined answer options were provided, to prevent the answers from being influenced and to allow a wide range of content in the answers. The questions were designed to provide detailed insights into the student's preferences concerning different aspects of instructional videos, collecting both quantitative and qualitative data to gain a comprehensive picture of student opinions. Based on the findings of the survey, the topics and scope of the video tutorials was designed. A total of 13 students participated in the survey, which represents a relatively small number. However, at the time of the survey, the total number of active students in the bachelor's programme was 18, which corresponds to an approximate percentage share of 72.22 %. Generally, conservation programmes have low student numbers across all specialisations, compared to other study programmes. Only two master's students took part in the survey, which is likely due to the fact that the Master's programme for the first Master semester had only just begun at the time of the survey. It was also made clear at the outset that the survey was primarily intended for the Bachelor programme.

The individual questions are analysed below. For the sake of clarity, the answers have been grouped by topic in the diagrams. The exact answers can be found in the appendix. In addition to the survey questions, the survey included voluntary questions about the names of the students and one optional question: *"Thank you for your answers. If you have any further questions/suggestions/wishes, please leave them here."* Both questions are not relevant for analysing the answers and will not be included in the analysis. All answers are displayed as ring diagrams. Due to the open-ended nature of the questions, responses overlap, with some participants providing multiple responses per question. Consequently, the analysis was conducted by categorising responses by the author.

²⁶ The survey was conducted with the google forms application. The analysis took place in Excel, including the creation of the diagrams. All the answers from each participant are in the appendix C1. Translation of the questions and results are made by the author. Prior to participation, students were verbally informed about the survey's objectives. All data collection and processing complied with current data protection regulations (GDPR), and participation was voluntary and anonymously if desired.

question 1 “In which semester are you studying?”

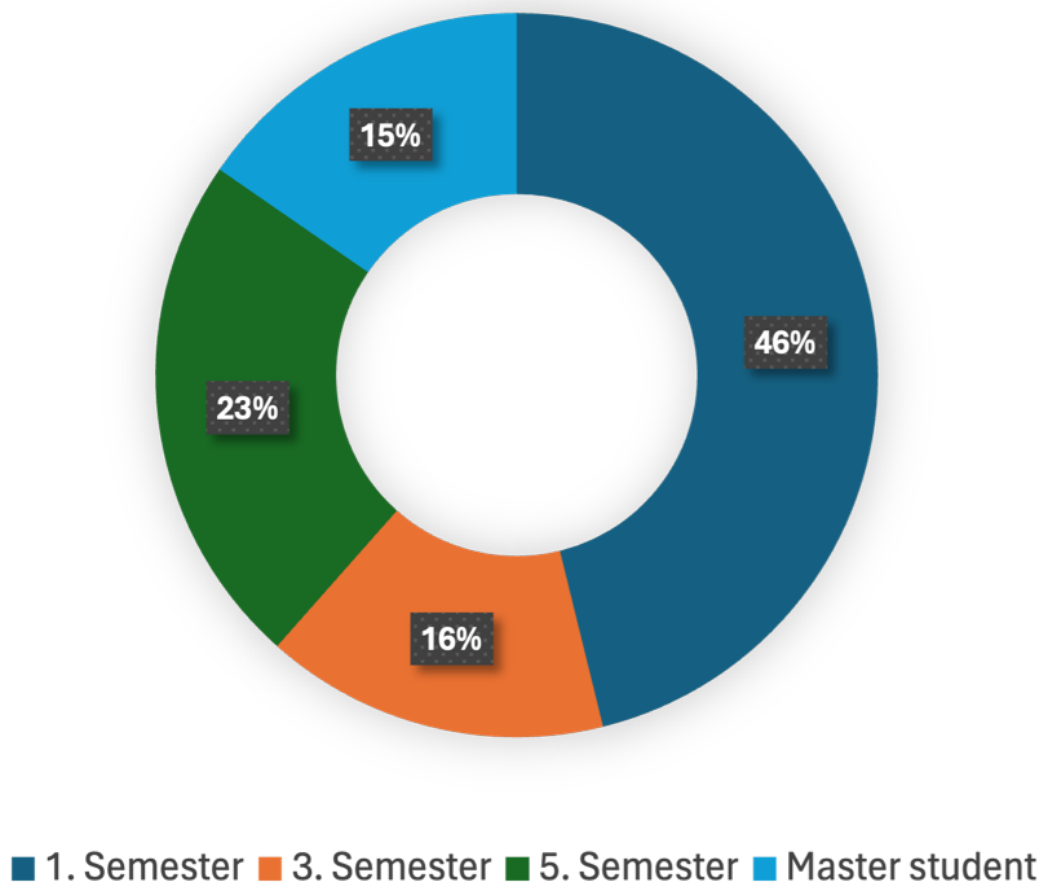


Figure 11 results question one: In which semester are you studying?

This answer shows that almost half of the respondents are in the first semester of their degree programme, which indicates that many young or newly enrolled students took part in the survey. The remaining responses are relatively evenly spread across higher semesters, with a small proportion of students on master’s programmes. This gives an overview of the academic diversity of the student population in terms of semester of study.

question 2 “Have you already completed a course of study or training? If so, which one?”

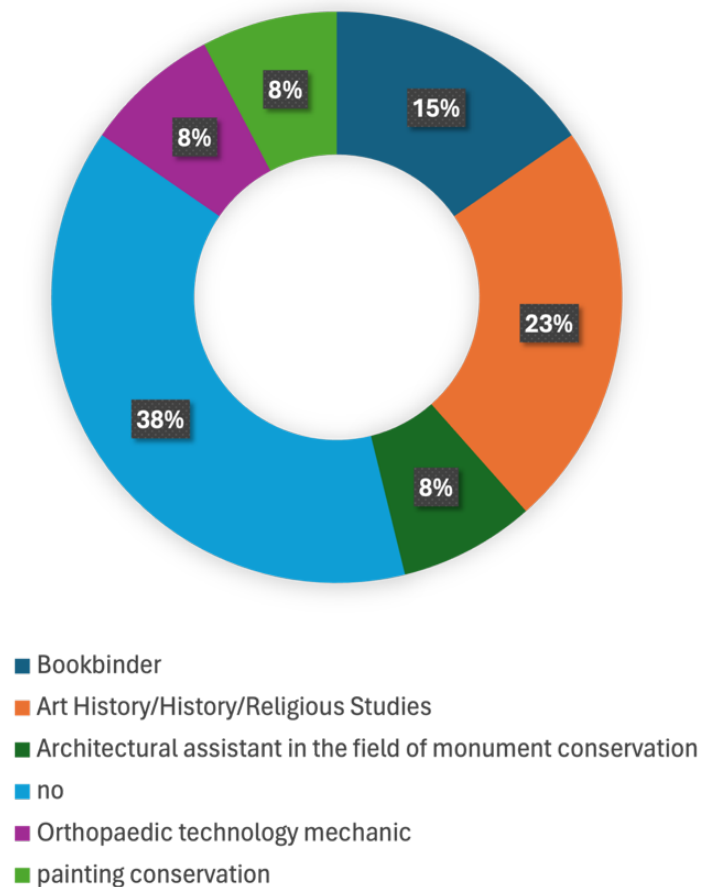


Figure 12 results question two: Have you already completed a course of study or training? If so, which one?

The figures demonstrate that most respondents have not completed any specific training or studies. A smaller proportion have completed training or studies or initiated a study programme but did not complete it. The responses were diverse. An apprenticeship in bookbinding was more prevalent at the outset of study programmes in the 1990s or 2000s. As previously discussed in chapter 2 conservation emerged from a craft tradition, and thus many paper conservators from the experienced generation are also bookbinders. Nevertheless, it is not uncommon for students to pursue conservation through the bookbinding trade. Another route through which students may find their way into conservation is through the study of art history or history, which is a common entry point to conservation studies in other disciplines such as painting conservation. It is also worth noting that some students enter the programme via a lateral route. One such example is a person who has trained as an orthopaedic technician or as an architectural assistant in the field of heritage conservation and has completed an apprenticeship.

question 3 What did you specialise in during your pre-study internship? Graphics, book, archive, exhibition, other?

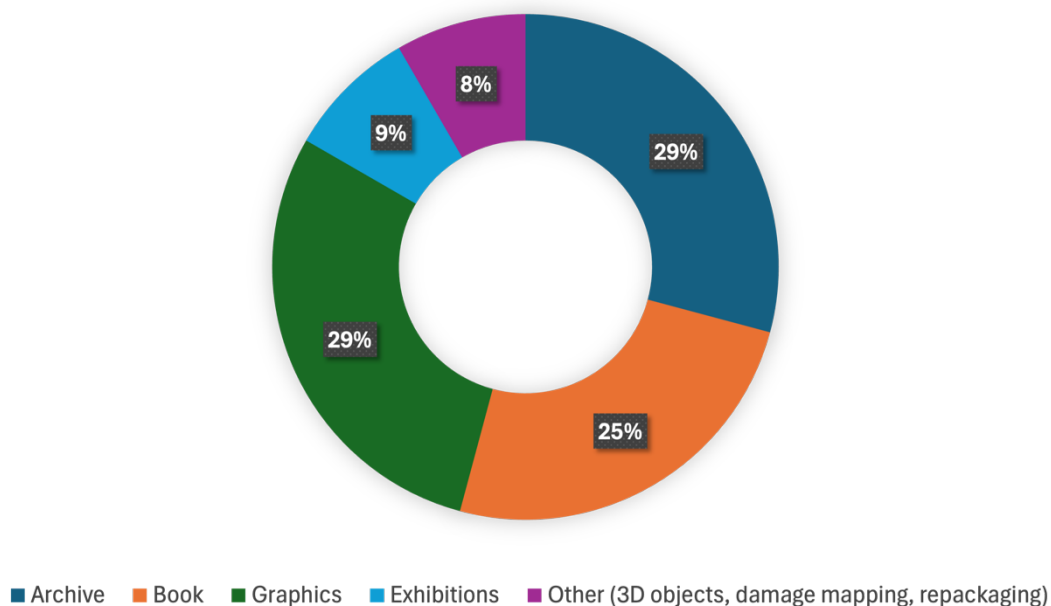


Figure 13 results question three: What did you specialise in during your pre-study internship? Graphics, book, archive, exhibition, other?

Prior to commencing their studies at the CICS, all potential students are required to complete an entrance exam and a one-year pre-study internship. The percentages illustrate the distribution of specialisations in the pre-study internships, based on the responses provided. The focus of the pre-study internship, and therefore the prior knowledge students bring to their studies at CICS, varies depending on the location of the internship.

The analysis indicates that the most common areas of specialisation are archives and graphics, followed by book, while exhibitions and the “other” category have the lowest number. This suggests that many students completed their pre-study work placement in an archive or museum. Students often provided multiple responses to this question, as a pre-study internship with a freelancer does not permit a clear distinction between specialisations.

Question 4: Have there been any topics in your studies, pre-study work placement or training where you would have liked a visual explanation (practical demonstration, video or at least pictures)? In the practical units or also in the scientific subjects?

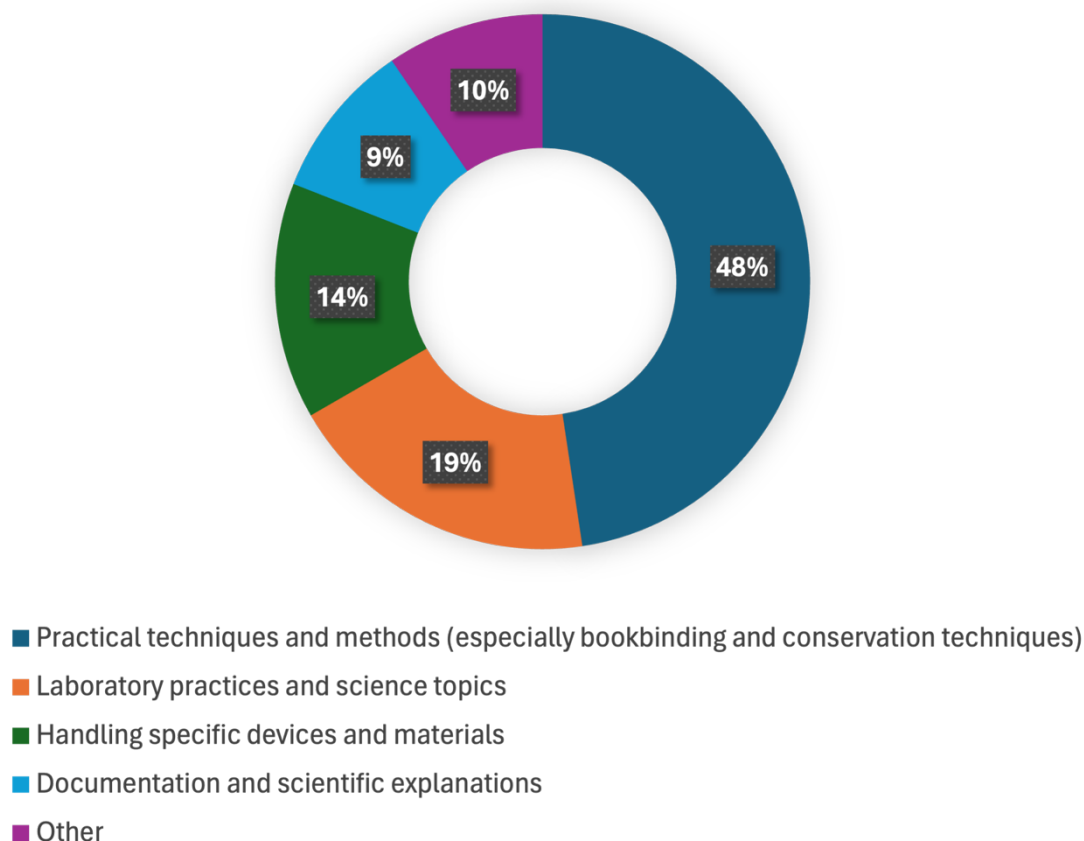


Figure 14 results question four: Have there been any topics in your studies, pre-study work placement or training where you would have liked a visual explanation (practical demonstration, video or at least pictures)? In the practical units or also in the scientific subjects?

The responses indicate a broad range of topics for which the use of visual aids, such as videos, images, or practical demonstrations, is perceived as beneficial and desirable. There appears to be a particular need for visual support in the context of practical applications. Bookbinding techniques such as wooden cover binding, fanfold binding, rebacking, joint tacketing, and leather conservation were mentioned. General conservation techniques such as leaf casting or lining were also mentioned. In the field of laboratory practices, the issue of handling and disposal of chemicals and occupational safety was highlighted. Instructions for documentation devices, such as Reflectance Transformation Imaging (RTI) Dome and different microscopes, were also referred to. There was also a desire for more integration of theoretical content in practice.

This could suggest that these areas are characterised by a high degree of complexity and the necessity for precise explanations. It may also be the case that these are the areas in which younger students feel most insecure about doing something wrong, what the next question was aimed at.

Question 5 Are there any topics/procedures/techniques during your studies, pre-study work placement or training that you were afraid to ask about because you had the feeling that everyone else took them for granted, e.g. making paste, closing tears, sharpening leather, knotting stitching thread?

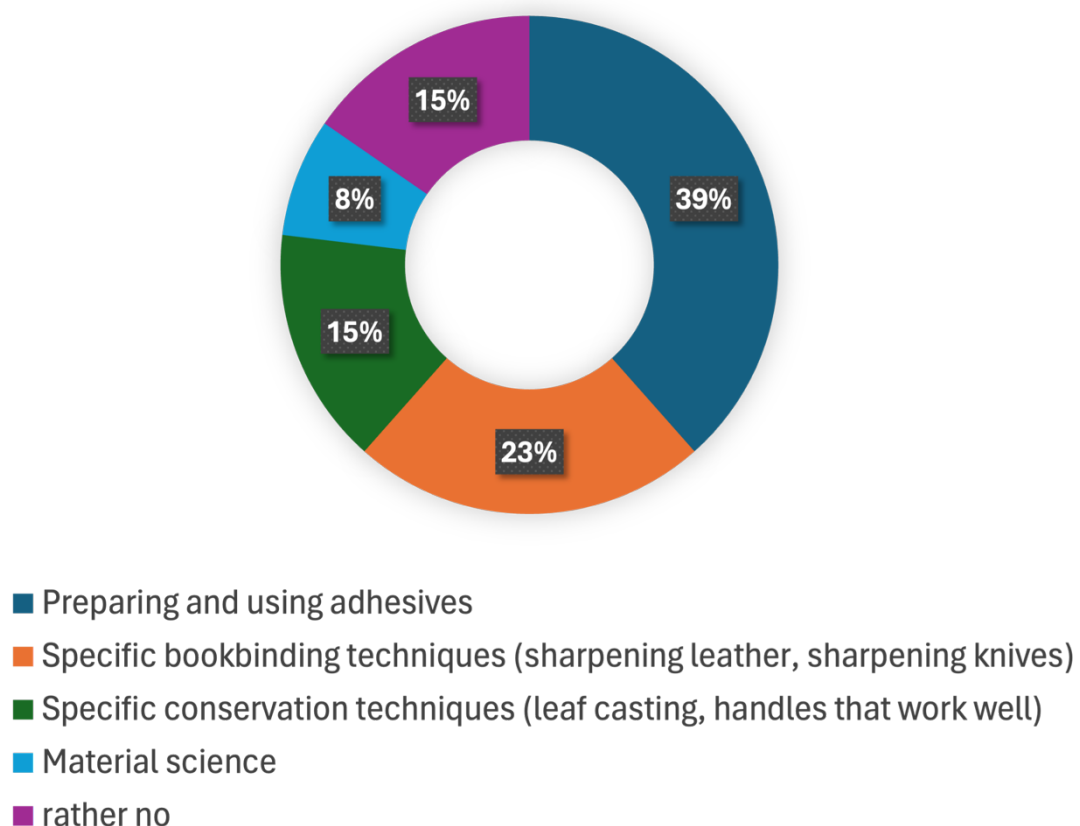


Figure 15 results question five: Are there any topics/procedures/techniques during your studies, pre-study work placement or training that you were afraid to ask about because you had the feeling that everyone else took them for granted, e.g. making paste, closing tears, sharpening leather, knotting stitching thread?

The data indicates that uncertainty in the preparation and application of adhesives, such as wheat starch paste, was the most frequently mentioned topic, followed by specific bookbinding techniques like sharpening leather and pairing knives and the use of certain materials like Aero Cotton. It appears that fundamental, yet essential techniques are often taken for granted, even though not all individuals involved feel confident in them.

This confirms the need for educational and training programmes to ensure that even seemingly basic topics are adequately covered, and questions are encouraged.

Question 6 Which conservation/restoration technique have you heard of but not found any (sufficient) literature or explanation? e.g. posts on social media (soaking with surfactants)

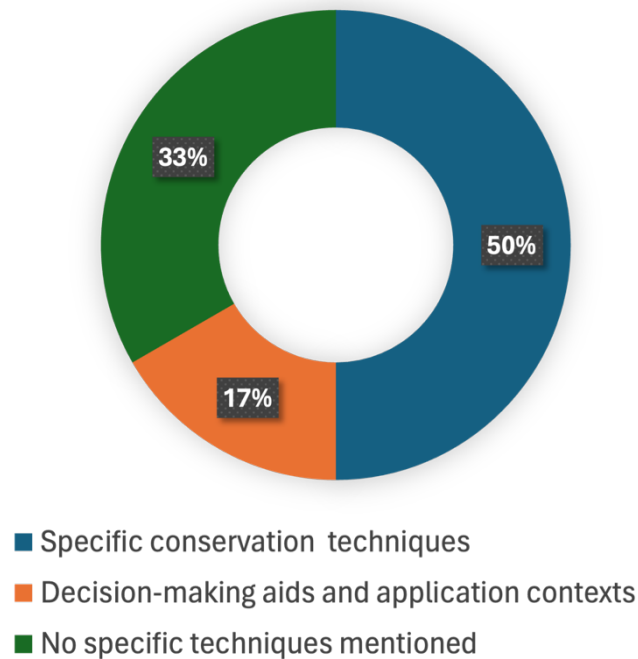


Figure 16 results question six: Which conservation/restoration technique have you heard of but not found any (sufficient) literature or explanation? e.g. posts on social media (soaking with surfactants)

These figures show that half of the respondents mentioned specific conservation techniques for which they could not find sufficient literature or explanations like photography conservation or leaf casting. Another significant proportion of responses mentioned the lack of decision guidance explaining when specific methods should be used, for example in the case of different bleaching techniques. This suggests that training and literature should better cover both specific techniques and general guidelines for their application.

Question 7 What problems/questions do you encounter when reading specialised articles, e.g. incomplete recipe details, imprecise description of how to carry out the recipe or linguistic hurdles in English-language texts?

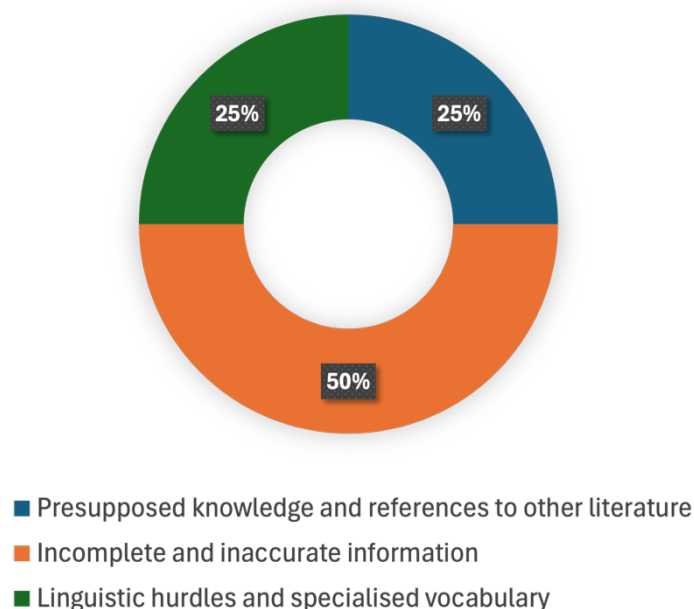


Figure 17 results question seven: What problems/questions do you encounter when reading specialized articles, e.g. incomplete recipe details, imprecise description of how to carry out the recipe or linguistic hurdles in English-language texts?

The data presented in these figures indicate that the main challenges encountered when reading specialised articles are the presence of incomplete and inaccurate information like time specifications or number of cycles for a measure, followed by language barriers when it comes to technical terms and the assumption of knowledge or references to other literature. This evidence suggests that a more transparent and comprehensive approach to the presentation in specialised articles, along with a more nuanced consideration of language and the educational level of readers, is essential to enhance accessibility and comprehension.

Question 8 Have you already made videos about conservation techniques to help you remember them later? If so, which technique?

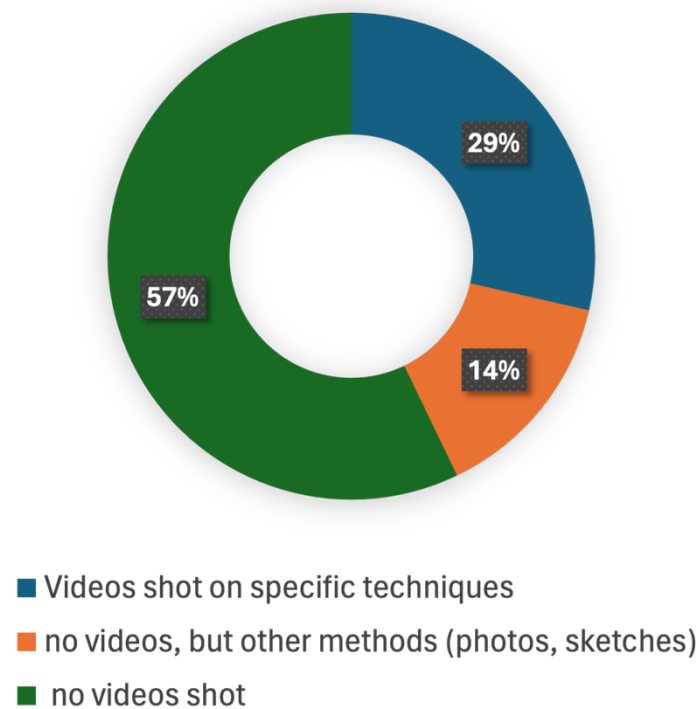


Figure 18 results question eight: Have you already made videos about conservation techniques to help you remember them later? If so, which technique?

The data indicates that most respondents have not yet created videos on conservation techniques. A smaller number of respondents have created videos on specific techniques like making endbands, bleaching or lining. Some have expressed interest in doing so in the future, while others have indicated that they use other methods to document their work like pictures or sketches. This indicates that the creation of video tutorials could be a potentially useful resource, although it is not yet widely used.

Question 9 How long can you really pay attention to a video or PowerPoint?

5 min, 10 min or longer?

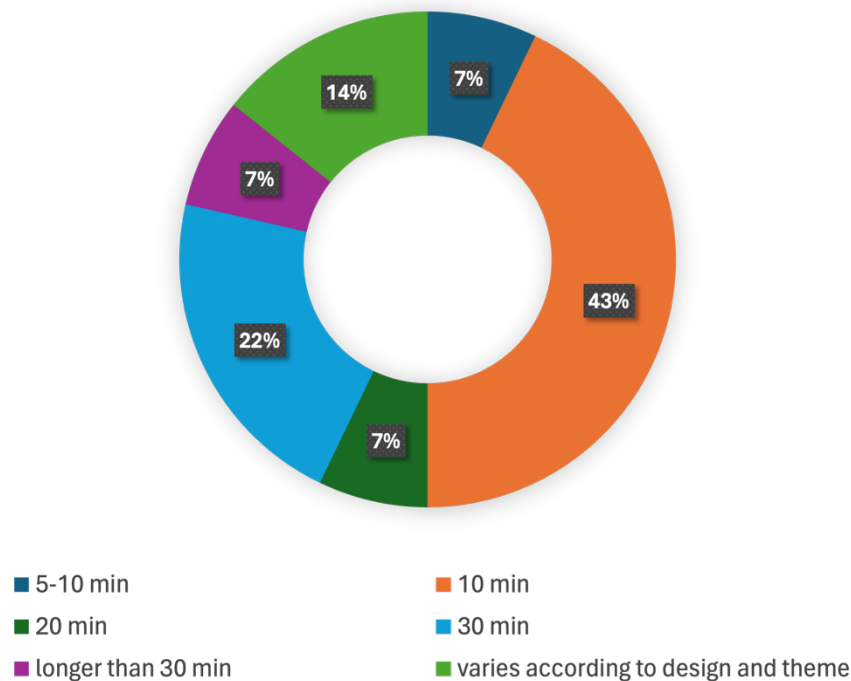


Figure 19 result question nine: How long can you really pay attention to a video or PowerPoint? 5min, 10 min or longer?

The results of this question indicate that most respondents can maintain their attention for approximately 10 minutes, with a smaller proportion able to remain focused for up to 30 minutes. A smaller proportion of respondents indicated that the duration of their attention is strongly influenced by the quality and design of the content. It is important that educational materials, such as videos or presentations, are well structured for example by using time stamps and appealing to optimise the audience's attention.

Question 10 Which of the following interest groups best matches your personal competences: the “practical conservator”, the “chemical analyst”, the “conservation technician”, the “project manager/mediation” or the future “manager”?

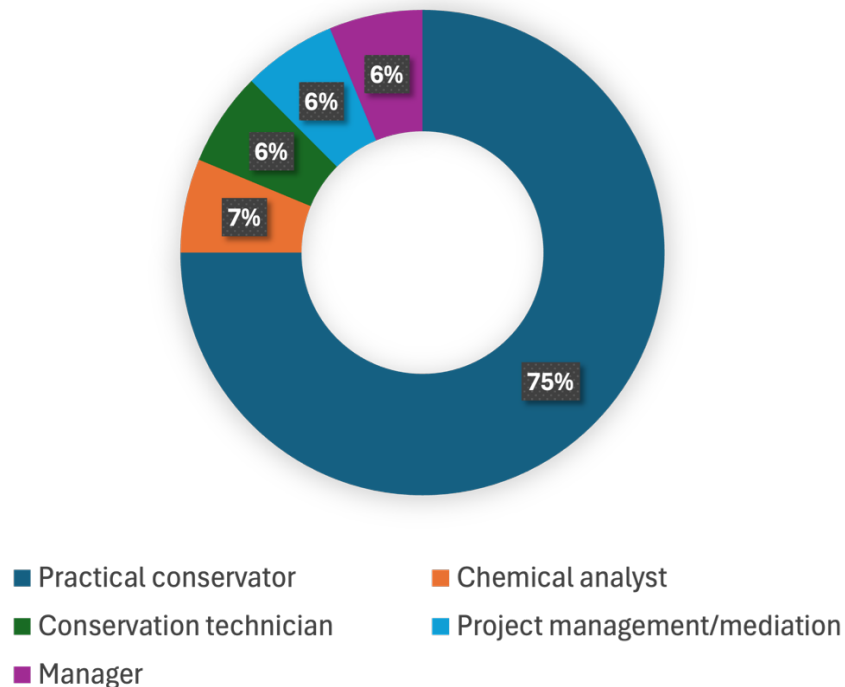


Figure 20 result question ten: Which of the following interest groups best matches your personal competences: the ‘practical restorer’, the ‘chemical analyst’, the ‘restoration technician’, the ‘restoration mediator’ or the future ‘manager’?

The analysis clearly demonstrates that most respondents identify as “practical conservator”, indicating that this group best reflects the personal competencies of most respondents. A minority of respondents identified with other specialised or management-oriented roles or see these skills as supplementary to those of a “practical conservator”. This reinforces the centrality of practical skills in conservation.

Having established the theoretical framework for video tutorials in conservation education, this section presents key findings from the student survey conducted within the project. The feedback collected from the survey illustrates a clear demand for video tutorials that are concise, visually engaging, and tailored to cover both basic and complex conservation techniques. Notably, the survey revealed a significant inclination towards practical demonstrations, especially in areas that students find technically challenging or particularly complex. This suggests an opportunity for lecturers to enhance learning experiences by

developing resources that address these needs, potentially increasing student confidence and competence in practical applications.

The *diverse backgrounds* and educational pathways of the students also enrich the learning environment and illustrate the varied interests and expertise within the field. This suggests that the video tutorials should be diverse and comprehensive. Furthermore, this diversity supports the concept of personalised learning pathways within the curriculum, which accommodate various levels of prior knowledge and experience.

The data regarding *attention spans* and *video length* preferences shows the need for the creation of content that is not only educational but also engaging and well-paced to maintain student interest and facilitate effective learning. The ideal format demands short presentations of three to ten minutes focusing on specific conservation techniques, supported by clear audio-visual quality and controlled pacing. The use of timestamps makes it easier to identify relevant information within the videos. A focused and engaging video structure seems important. Students demonstrate a strong preference for *practical videos* that demonstrate specific techniques or processes from an instructor perspective. It is therefore recommended that theoretical content be supported with practical examples to illustrate the relevance and applicability of the learned material. The *video design* should be clear and structured. Videos supported by logical organisation and visual highlights (such as graphics and key points) are preferred. It is evident that high-quality audio and video recordings are crucial, as poor quality can negatively impact student attention and engagement. Although not directly mentioned, additional features such as subtitles could be a good tool to accommodate different learning styles and needs.

These findings provide a solid foundation for developing effective video tutorials in paper conservation, demonstrating that successful tutorials must balance technical accuracy with engaging presentation. These elements must be thoughtfully integrated with broader learning materials and practical exercises. However, the successful implementation of video tutorials in conservation education extends beyond mere content creation. It requires institutional commitment to developing and maintaining high-quality resources, alongside their integration within comprehensive educational frameworks. Regular updates are necessary to reflect evolving conservation practices. While the investment in creating such resources is substantial, the potential benefits – including standardised instruction, flexible learning opportunities, and enhanced practical skill development – make it worthwhile. The key to success lies not in replacing traditional methods but in complementing them with thoughtfully designed digital resources that meet the specific needs of conservation education.

This analysis sets the stage for the following chapters, which will examine the practical implementation through a detailed tutorial of the “volatile binder” video, showing how theoretical principles and student preferences translate into effective educational content.

4.1.2 Content Designing Phase

The Content Designing Phase was a critical component of the “Jigsaw-Teaching in Conservation” project. This phase focused on creating video tutorials that were not only pedagogically sound but also engaging and suitable for the flipped classroom model (see chapter 4.1.4 and 5.1). The objective was to design content that could stand alone as individual learning units but also connect seamlessly to form a comprehensive educational programme. The University of Rostocks document on “Lehrvideos” (Harder, n.d.) outlines essential principles for creating and using educational videos in professional and higher education settings. Two fundamental aspects of successful educational videos: didactic quality and technical excellence were mentioned. Educational videos offer unique advantages in knowledge transfer through their dynamic visualisation capabilities. They excel at demonstrating practical procedures, spatial relationships, and sequential processes. Their ability to portray real-life situations and human interactions creates an engaging learning experience that can enhance student motivation. However, these learning tools also present certain challenges. The fleeting nature of video content and the potentially passive viewing experience require careful consideration in their design. To address these challenges, videos should include playback controls allowing learners to revisit content as needed. Additionally, the content must be structured thoughtfully to maintain clarity and prevent cognitive overload. Research by Findeisen *et al.* (2019) reveals that learners prioritise technical aspects such as production quality and video length over content-related elements like information density and comprehensibility, which make professional production values important. The versatility of educational videos makes them valuable across various learning contexts, from online courses and independent study to flipped classroom approaches and problem-based learning scenarios. These theoretical foundations were observed and built upon during this phase. The survey of the students and the experiences of the conservators in the project were considered to identify the following topics (German and English) for realisation as a video tutorial:

1. Test Wasserlöslichkeit - water solubility test
2. Wässern von Papier im Bad - aqueous treatment
3. remoistenable tissue
4. Kaschieren von Papier - lining
5. Tintenfraß erkennen - damage classification of ink corrosion
6. Tintenfraß behandeln - treatment methods for ink corrosion
7. Celluloseether - cellulose ethers
8. Kleister kochen - wheat starch paste
9. Montieren von Papier - hinging: the V- and T-hinge
10. Befeuchtungsarten von Papier - the humidification of paper
11. Wassertropfentest - water drop test
12. Ledermesser schärfen - sharpen a leather-paring knife
13. Ansetzen von Pasten (Kompressen) in der Restaurierung - poultices/pastes
14. Ansetzen von Proteinklebstoffen- protein-based adhesives
15. Wasser anreichern - water enrichment
16. Fehlstellenergänzung - loss filling in paper
17. Leder schärfen - skiving leather
18. Ionische Fixierung - ionic fixation
19. Anfasern von Papier - leaf casting
20. Die Heftlade - sewing frame
21. Heften auf Bünde - stitching on sewing supports
22. Wechselstichheftung - saddle stitch binding
23. Ansetzen einer Calciumhydroxidlösung - calcium hydroxide solution
24. Ansetzen von Gelen in der Restaurierung – poultices/gels
25. Flüchtige Bindemittel - volatile binders
26. Kettenstichheftung - chain stitch binding
27. Mikrochemische Nachweise - micro chemical tests

In addition, ten shorts (less than one minute long) were created on the initiative of students. These shorts were created completely independently by the students and were only accompanied by the project staff.

The topics were: the knot when stitching, blunt blade on the Schärffix^{®27}, dry cleaning tub, adding cardboard corners, solvent chamber, folding photo corners for mounts, copper test on the paper object, fixing cardboard corners on the book, and tearing Japanese paper strips.

Once topics were identified, the next step involved detailed storyboarding and scripting. Each video tutorial began as a storyboard that outlined the visual and narrative flow of the content. A storyboard is a visual representation of a film, video, or animation that outlines the sequence of events and key actions. It typically consists of a series of panels or frames, each illustrating a particular scene or shot along with accompanying notes. The storyboard provides a clear framework for the production process, helping to plan the visual storytelling, camera angles, movements, and transitions. It aids in pre-visualising each scene, coordinating the team, and ensuring that all creative and technical aspects are aligned. The storyboard is a crucial tool for translating the script or concept into a tangible plan for filming or animation. Fig. 21 shows an extract from the storyboard for the tutorial “volatile binders”. Each frame is labelled with a shot number and sometimes an additional identifier or scene number, such as Shot 13C or Scene 13. This helps in organising and referencing specific shots within the storyboard. Each shot is depicted with a sketch or drawing that visualises the main action or composition of the scene, including the positioning of characters, objects, and background elements. These sketches provide a rough visual guide for what the camera will capture. Below each visual representation, there is a description of the action taking place in the shot. For instance, “Deckel zuschrauben” (screwing the lid) or “Glas anheben und bewegen” (lifting and moving the glass). These descriptions clarify what is happening in each scene. Additionally, information about the camera setup and movement is provided, including the type of shot and the nature of the camera action, such as “Detail” (detail), “Groß” (large) or “statisch” (static). This helps the media office understand how to position and move the camera to achieve the desired effect. Each shot is associated with a specific duration in seconds and often includes the scene number for context. Timing information is crucial for planning the pacing and flow of the video. Some frames include additional notes or labels, like “Kapitel Auftrag, Unterkapitel Lösungen” (Chapter application, Subchapter Solutions) or “Materialien aufploppen” (materials pop up), which provide further context or instructions for the shot.

²⁷ Schärffix[®] is a manual blade sharpening tool, designed for precise sharpening of leather.

These storyboards were crucial for visualising the final video tutorial and ensuring that all necessary points were covered in a logical and engaging manner. The scripts were then written to match these storyboards, ensuring that the information was communicated clearly and concisely.

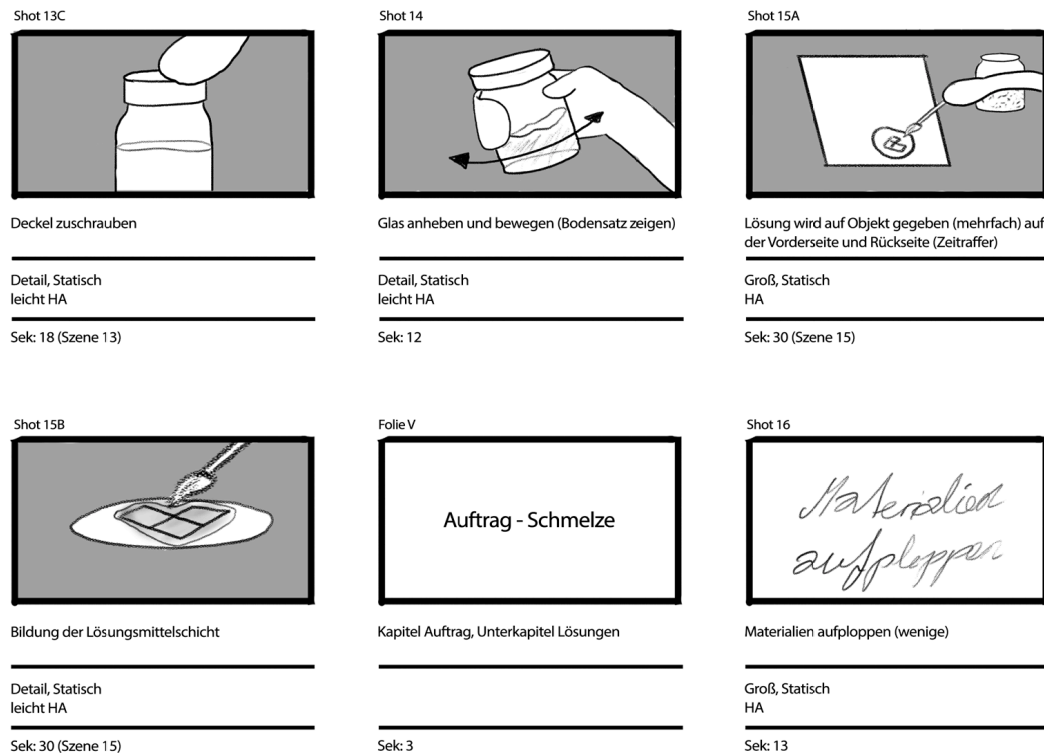


Figure 21 excerpt from the storyboard of “volatile binders”. © Tamara Zraggen

4.1.3 Content Creation Phase

This phase involves the actual production of the video tutorials including animations and voice overs.

Given the visual nature of conservation work, the design of the content needed to be particularly detailed and accurate (Fig. 22 and 23). High-quality images, diagrams, and animations were created to illustrate complex techniques and concepts. The project team invested in professional filming and editing to produce clear, visually appealing videos by buying professional filming equipment²⁸. The conservators in the team meticulously review the final scripts to ensure the information is accurate and clearly presented. This phase often

²⁸ Materials that were bought for this project include a filming camera Sony FX30, Microscopes that can also record films like the dental mikroskop from CJ Optik and microphones.

requires multiple takes to capture the best possible explanations and demonstrations of conservation techniques. Attention to lighting and sound quality is important, ensuring that the videos are both clear and engaging for the audience.



Figure 22 Working situation during filming, conservator Maike Linden, one employee of the media office TH Köln and Tamara Zgraggen (from left to right) filming a sequence of the video tutorial “Water Solubility Test”, © Marlen Börngen



Figure 23 Film excerpt from the video “volatile binders”

In the post-production phase, video editing plays a crucial role in making the tutorials both digestible and professional. The media office employees trim the footage, add overlays, annotations, and subtitles, and integrate graphical elements to enhance understanding. Additionally, background music and sound effects are carefully selected to improve viewer engagement without detracting from the instructional content. The frame.io software was used to simplify the collaboration between the media office, the designer and the conservators during post-production. Frame.io is a cloud-based video review and collaboration platform designed to streamline the video production process. It allows teams to upload, review, and provide feedback on video content in real-time.

The animation of a “silverfish” is an educational tool presenting for example mandatory safety protocols through a comic-strip character, the videos transform traditionally dry material into engaging sequences that capture the student’s attention. This animated approach acts as a cognitive support during challenging content sections, especially when explaining critical safety measures for various conservation methods. The humorous presentation style creates memorable associations between conservation methods and their required safety protocols, significantly improving information retention of procedural knowledge that students might otherwise dismiss and making safety information both entertaining and educational.

A professional narrator was hired for both the German and English videos, with the goal to build an emotional connection with the audience and provide continuity by guiding them through the video. In the case of the English videos, the German texts also had to be translated and overvoiced prior to their online publication. This process required a close examination of the translation, as the English translations of the technical terminology had to be thoroughly researched. This process was often challenging due to the absence of standardised terminology in the field.

It was important to check the transcriptions carefully, as YouTube creates its own subtitles, for example, German subtitles for the German videos to increase user accessibility. Errors in subtitles were identified in the video “Volatile binders” where the term “Cyclododecane” was transcribed as “Zyklon B”. Such inaccuracies in subtitles have the potential to be serious, so the videos were carefully transcribed by the “Accessibility” team at the TH Köln. This process shows an intensive learning curve for all participants, in addition to visual components, the scientific accuracy of spoken and subtitled text is crucial. A lot of resources have been invested in the correct visual and textual reproduction of the tutorials to ensure their scientific accuracy.

At the end of each video there is a disclaimer stating that the procedures shown in the videos should only be carried out by conservators or conservation students.

One of the finished video tutorials on the topic of “volatile binders” can be watched with the following QR code (Fig. 24).



Figure 24 QR code for the video tutorial “volatile binders” (in German)

4.1.4 Research Findings: Analysis of Student Learning Experiences

During the summer semester of 2024, the video tutorials created as part of the “Jigsaw Teaching in Conservation” project were introduced for the first time in the study programme of Conservation and Restoration of Written Material, Graphic, Photography and book illumination at CICS. The second Bachelor semester from the summer semester 2024 and the first Bachelor semester from the winter semester 2024/2025 were selected for analysis, as the students were still relatively new to the programme. The second semester’s conservation topic was book and leather conservation, while the first semester’s topic was graphic conservation. The conservation of books and leather involves the examination of a diverse range of materials, including paper, wood, leather and metal, and the acquisition of bookbinding knowledge is a preliminary step in this process. In the conservation of graphic, methods like the aqueous treatment of paper, bleaching or water enrichment were the subject of the semester. After the semesters had ended eight of the nine students (four in the first and four in the second semester) took part in a short survey about the new set up in the semesters. The evaluation of the questions is listed individually below. Questions 1-4 and 18 and 19 are aimed at the student’s usage behaviour with the video tutorials. And questions 5-17 focus on understanding and satisfaction with the tutorials.²⁹

All charts except questions 18 and 19 are bar charts. It uses vertical bars to represent the number of responses for each rating category. Each bar represents the percentage of

²⁹ The answers für each question in detail is in the appendix C2.

respondents who selected a particular rating. The height of the bars indicates the proportion of responses, while the numbers above the bars indicate these proportions as a percentage.

Below the graphs is a scale from 1 to 5, representing varying degrees of agreement or disagreement with the statement: 1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree. This scale allows respondents to express their opinion, with 1 being the lowest level of agreement and 5 being the highest.

Questions 18 and 19 are pie charts. It shows the distribution of responses in the form of coloured segments, each representing a proportion of the total responses. Each segment is labelled with a percentage indicating the proportion of the respective answer option. The legend on the right-hand side assigns specific response categories to the colours of the segments. All questions except question five: “Compared to the previous semester (parchment), I have the feeling that I can follow the course material better this semester.” were mandatory, since the first had no semester before it.

The question asked were the following:

Usage behaviour with the videos:

Question 1: I always watched the recommended videos before the workshop work. (Fig. 25)

Question 2: The video tutorials have increased my motivation for the practical work. (Fig. 26)

Question 3: I follow up on the contents of the workshop work. (Fig. 27)

Question 4: I can imagine using the video tutorials again later as a reminder. (Fig. 28)

Question 18: How often do I watch the video tutorials before workshop time? (Fig. 42)

Question 19: How often do I watch the video tutorials as a follow-up? (Fig. 43)

Understanding and satisfaction:

Question 5: Compared to the previous semester (parchment), I have the feeling that I can follow the course material better this semester. (Fig. 29)

Question 6: The video tutorials help me to understand the subject matter better. (Fig. 30)

Question 7: I would like more video tutorials. (Fig. 31)

Question 8: I would also like other lectures to be held using the flipped classroom concept.

This means that some theoretical content is made available digitally in advance and then there is more time for practical work/discussions. (Fig. 32)

Question 9: I have the feeling that I can determine my own learning pace. (Fig. 33)

Question 10: I can acquire learning content flexibly in terms of time. (Fig. 34)

Question 11: I have the feeling that the workshop work takes up too much time compared to the other lectures/seminars. (Fig. 35)

Question 12: The video tutorials prepare me sufficiently for the workshop work. (Fig. 36)

Question 13: Watching additional video tutorials before workshop time is very time-consuming. (Fig. 37)

Question 14: The video tutorials are clearly structured. (Fig. 38)

Question 15: The video tutorials are too long for me. (Fig. 39)

Question 16: The discussions with the lecturers during workshop time help me to better understand certain content. (Fig. 40)

Question 17: The video tutorials give the workshop work more structure. (Fig. 41)

question 1 always watched the recommended videos before the workshop work.

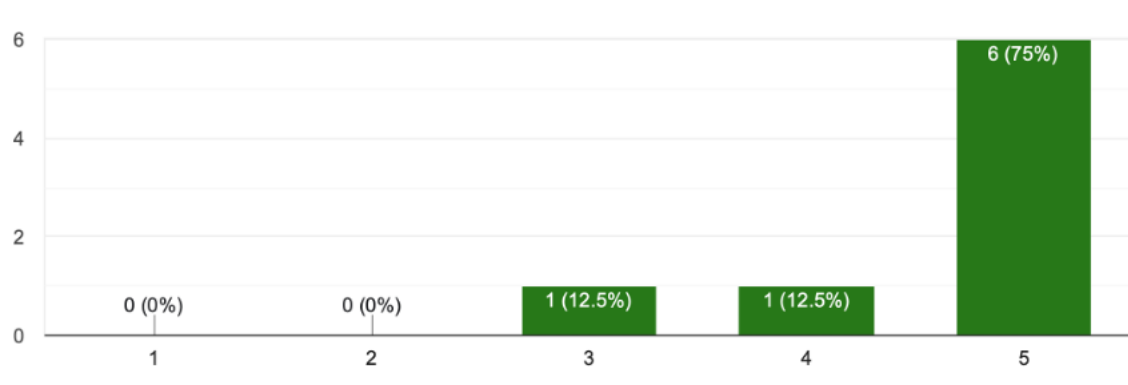


Figure 25 Most of the students strongly agreed (75 %) with the statement “I always watched the recommended videos before workshop work” asked in question 1. This indicates a very high usage of the recommended videos in this semester.

question 2 The video tutorials have increased my motivation for the practical work.

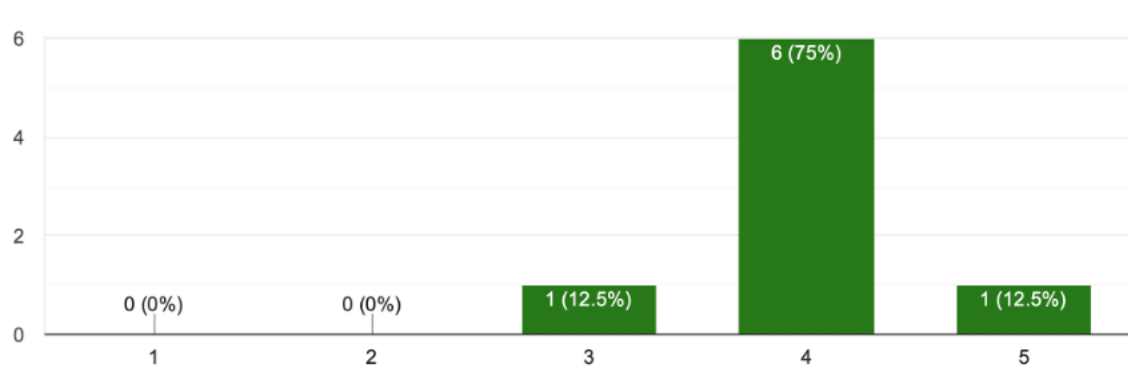


Figure 26 The majority of respondents (87,5 %) agree or strongly agree with the statement “The video tutorials have increased my motivation for the practical work”. This indicates that the video tutorials have a positive effect on the motivation of the participants.

question 3 I follow up on the contents of the workshop work.

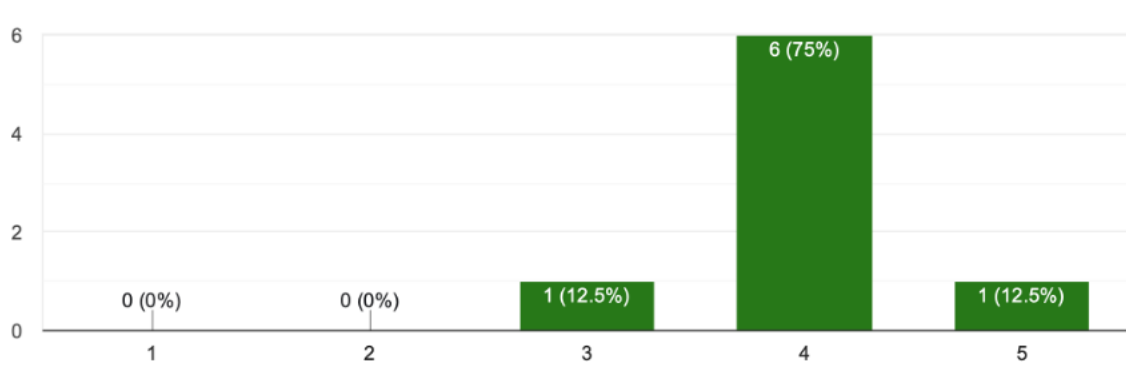


Figure 27 The analysis of question 3 shows that the majority of respondents (87,5 %) agree or strongly agree that they follow up on the content of the workshop work. One respondent 12,5 %) stated that they do this to some extent. This indicates that most participants find the follow-up important, but there is room for greater motivation in relation to the follow-up of the workshop time.

question 4 I can imagine using the video tutorials again later as a reminder.

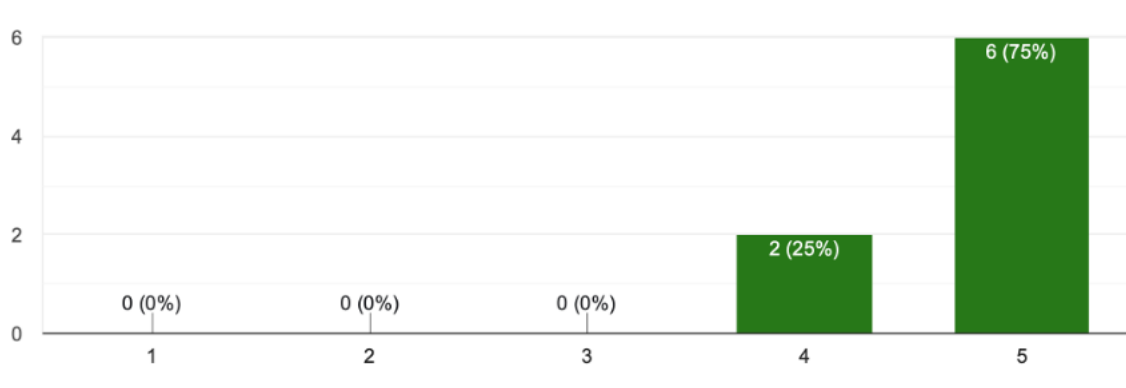


Figure 28 The analysis of question 4 shows that the majority of respondents (75 %) strongly agree with the statement “I can imagine using the video tutorials again later as a reminder”. A quarter of respondents (25 %) agree. This indicates that the video tutorials are seen as a valuable resource for the future.

question 5 Compared to the previous semester (parchment), I have the feeling that I can follow the course material better this semester.

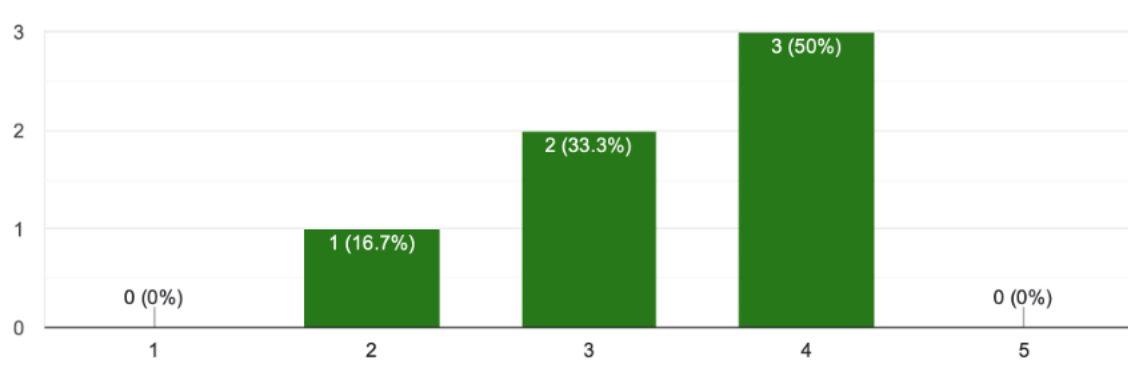


Figure 29 The analysis of question 5 shows that half of respondents (50 %) agree with the statement “Compared to the previous semester (parchment), I have the feeling that I can follow the course material better this semester”. One third (33,3 %) is neutral to the statement and one person disagree (16,7%). This indicates that most participants perceive an improvement in their understanding of the course material compared to the previous semester. However, there is still potential for improvement here in order to include all students in the process. Also some students from the first semester did answer the question even though they didn't had a parchment semester at this time of the survey.

question 6 The video tutorials help me to understand the subject matter better.

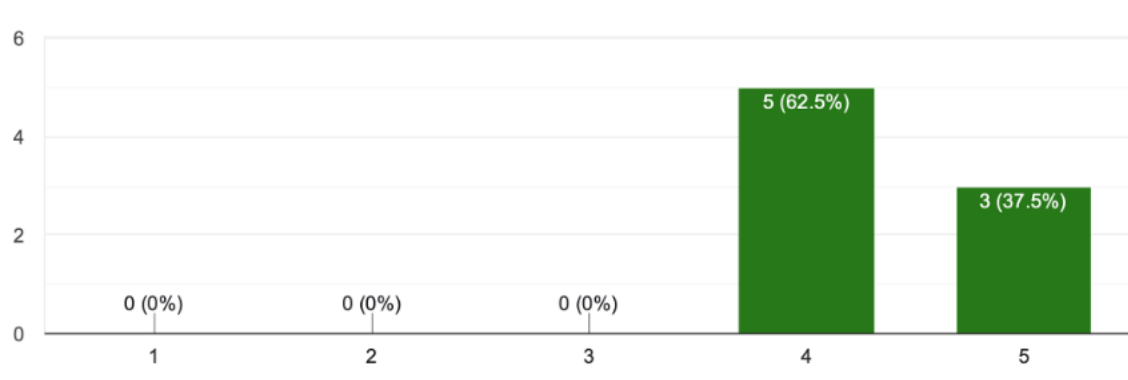


Figure 30 The analysis of question 6 shows that all respondents agree (62,5 %) or strongly agree (37,5%) with the statement “The video tutorials help me to understand the learning material better”. This indicates that the video tutorials are seen as an effective means of improving understanding of the learning material.

question 7 I would like more video tutorials.

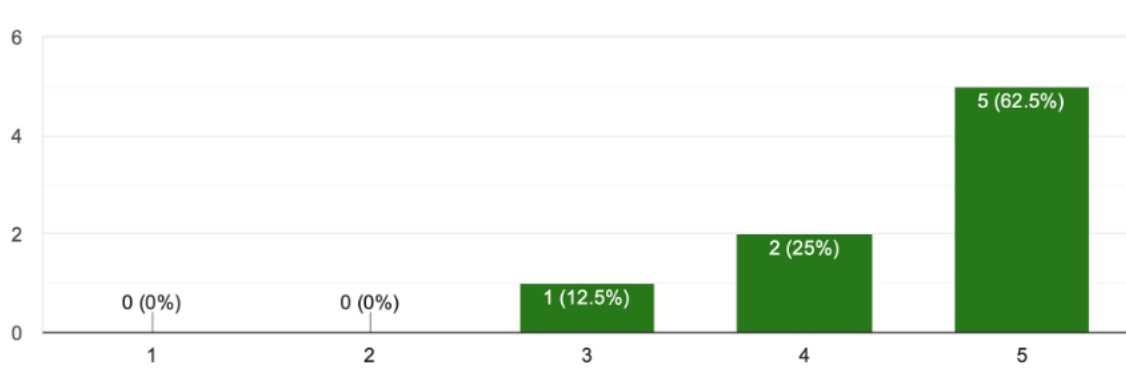


Figure 31 There is a strong interest in more video tutorials in the future. Participants agreed or strongly agreed with this statement (87,5 %). Only one person was neutral to this statement.

question 8 I would also like other lectures to be held using the flipped classroom concept. This means that some theoretical content is made available digitally in advance and then there is more time for practical work/discussions.

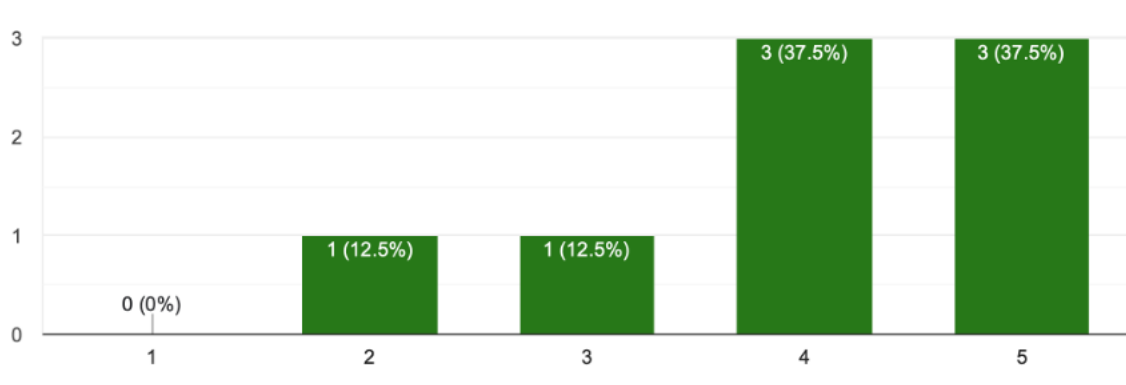


Figure 32 The evaluation of the scheme shows that the majority of respondents (75 %) strongly agree or agree with the statement “I would also like other lectures to be held using the flipped classroom concept”, while 12,5 % are neutral or disagree. This indicates that there is an interest in using the flipped classroom concept in other lectures. However, there are probably still uncertainties regarding the implementation of the format.

question 9 I have the feeling that I can determine my own learning pace

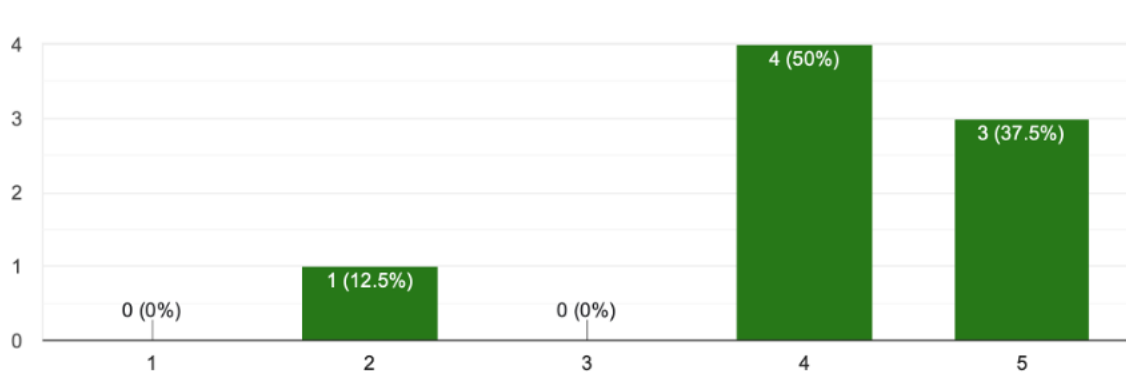


Figure 33 Most participants have the feeling that they can determine their own learning pace 87,5 %), even if the answers diverge somewhat more strongly here. One person disagree (12,5 %).

question 10 I can acquire learning content flexibly in terms of time.

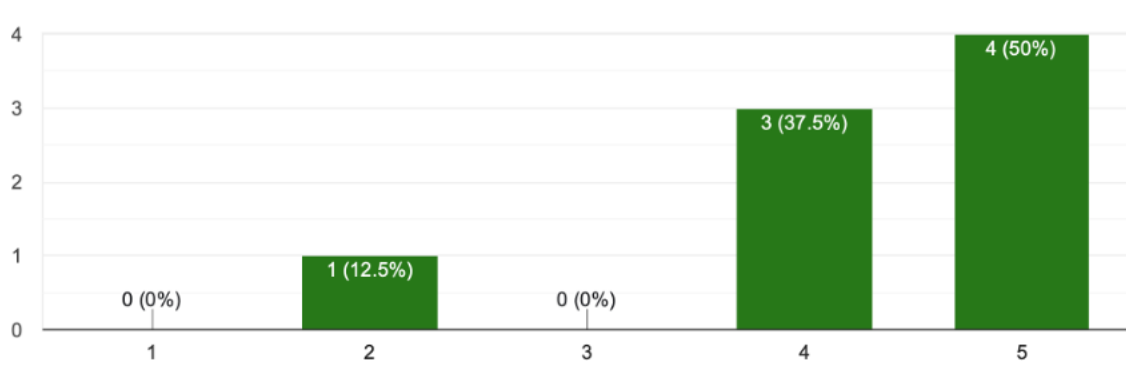


Figure 34 Question 10 is similar to question 9, with the majority of respondents agreeing or strongly agree (87,5 %) with the statement “I can acquire learning content flexibly in terms of time”. However, there is also room for improvement here, as the answers differed greatly. One person even disagreed with this statement.

question 11 I have the feeling that the workshop work takes up too much time compared to the other lectures/seminars.

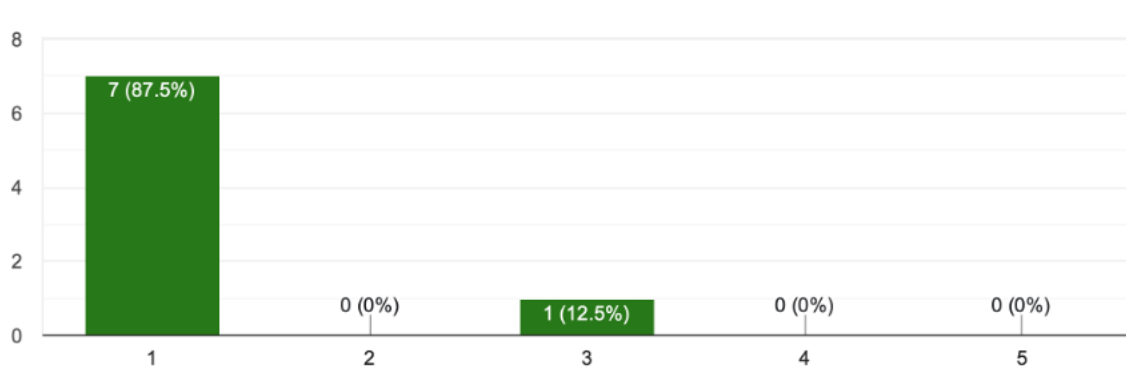


Figure 35 Most participants (87,5 %) do not feel that the workshop work takes up a lot of time compared to other courses. One person, on the other hand, is rather unsure (neutral) about this, which probably has to do with the high workload during the semesters.

question 12 The video tutorials prepare me sufficiently for the workshop work.

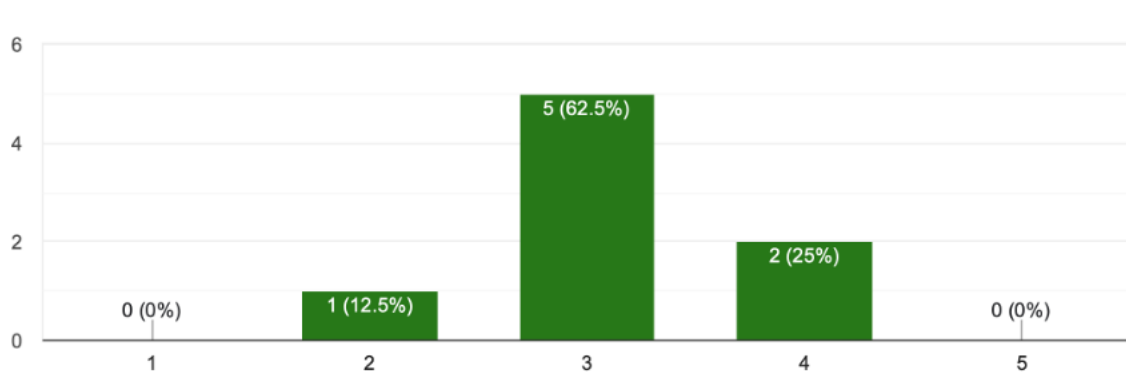


Figure 36 The participants felt that the preparation provided by the video tutorials was sufficient but could be improved, with most answers in the middle of the scale (62,5 %).

question 13 Watching additional video tutorials before workshop time is very time-consuming.

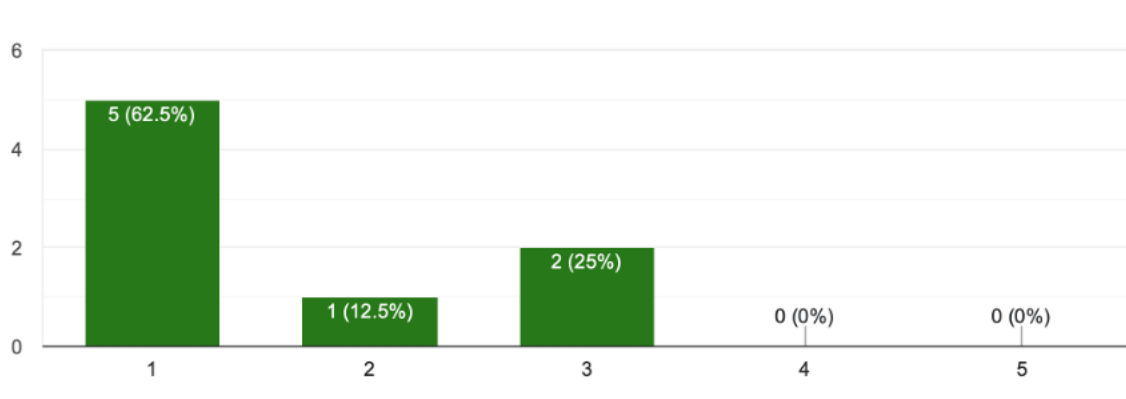


Figure 37 Most participants disagree or strongly disagree (62,5 %) do not find watching the video tutorials very time-consuming. 25 % were neutral. The answers certainly also depend on how many videos are to be watched in preparation. This varies greatly from week to week.

question 14 The video tutorials are clearly structured.

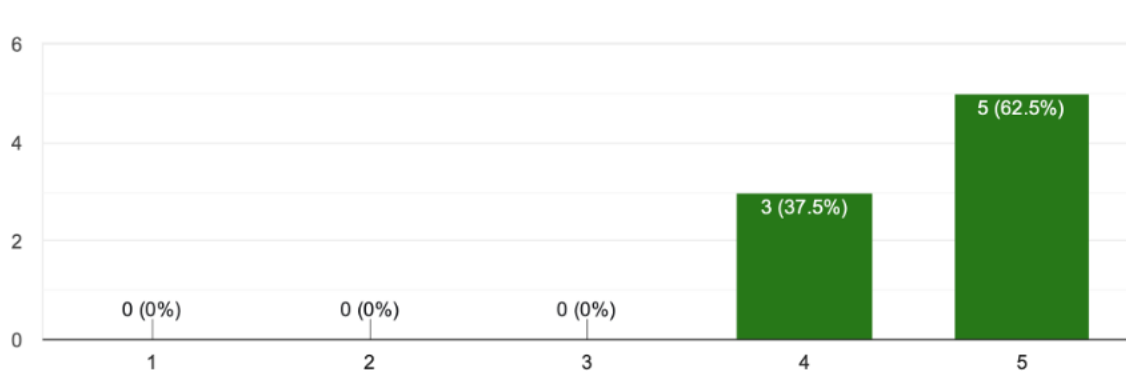


Figure 38 This pattern indicates that the video tutorials are generally perceived as clearly structured with 100 % agree or strongly agree.

question 15 The video tutorials are too long for me.

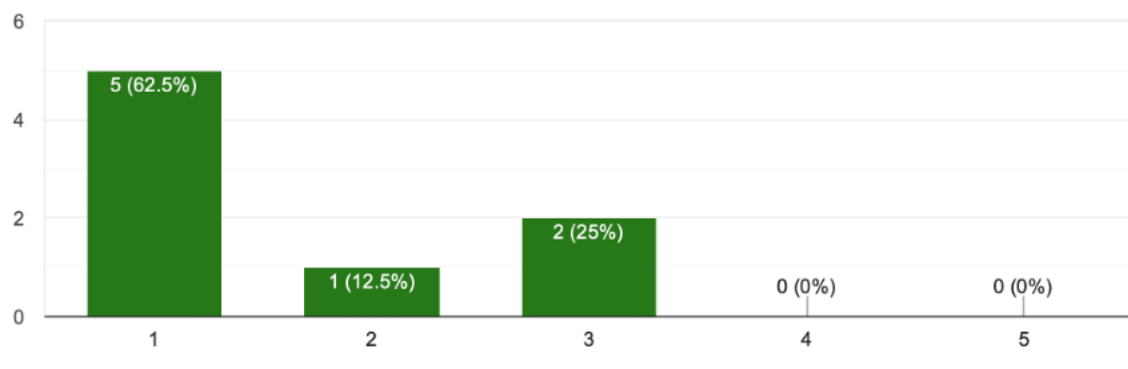


Figure 39 The evaluation of this question indicates that the participants consider the length of the video tutorials to be appropriate with 75 % strongly disagree or disagree and 25 % neutral.

question 16 The discussions with the lecturers during workshop time help me to better understand certain content.

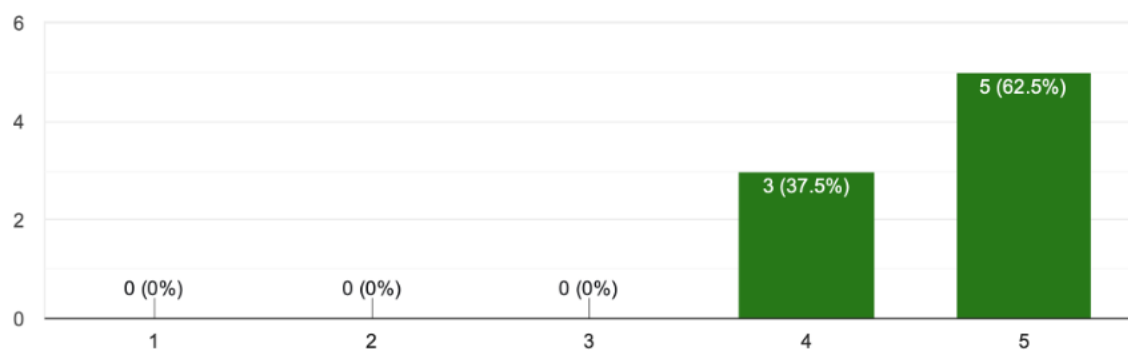


Figure 40 All participants strongly agree or agree with the statement „The discussions with the lecturers during workshop time help me to better understand certain content“. This indicates that the participants find the discussions with the lecturers during workshop time very helpful for understanding certain content.

question 17 The video tutorials give the workshop work more structure.

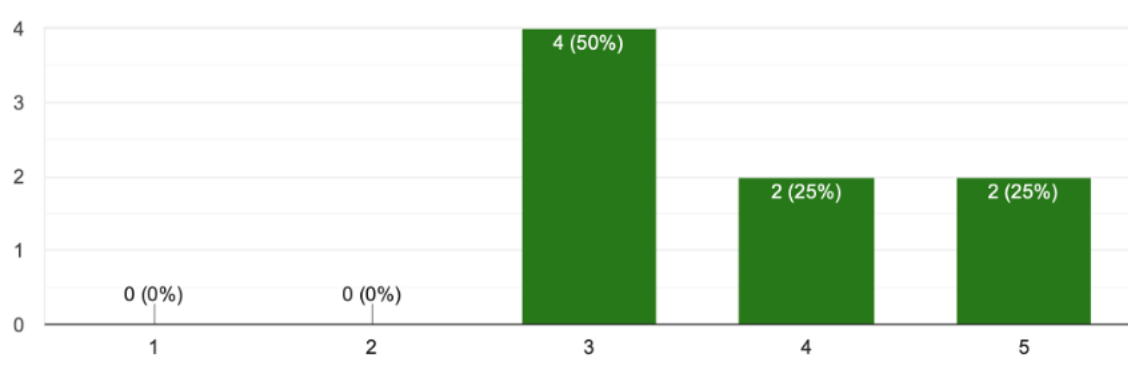


Figure 41 The evaluation of this question indicates that the participants find the video tutorials helpful for structuring the workshop work, with some perceiving this more strongly than others. 50 % agree or strongly agree whereas 50 % are neutral.

question 18 How often do I watch the video tutorials before workshop time?

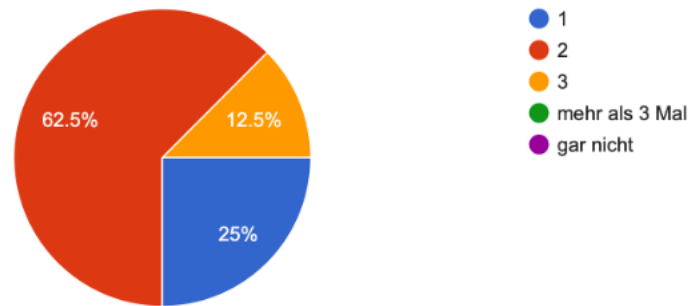


Figure 42 All participants watch the tutorials at least once, although most participants watch the tutorials twice (62,5 %). The tutorials are well received as preparation.

question 19 How often do I watch the video tutorials as a follow-up?

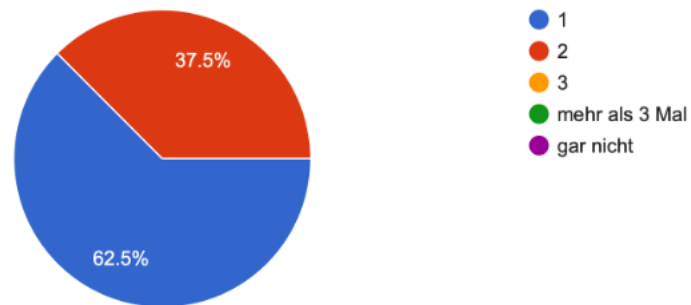


Figure 43 The analysis of the diagram shows that 62,5 % of respondents watch the video tutorials once as a follow-up. The other 37,5 % watch them twice. This indicates that the participants regularly use the tutorials for follow-up.

At the beginning of the survey, it was found that the majority of participants regularly watched the recommended videos before the workshop work. This indicates that the video tutorials are seen as an integral part of the preparation. In addition, many participants stated that the tutorials increased their motivation for the practical work. This motivation could be due to the opportunity to acquire theoretical knowledge in advance and thus better prepare for the practical tasks. Most participants find it important to follow up on the workshop time, but this does not necessarily take place. The reasons for this were not asked, but it could be related to the study load from other modules. Another important aspect of the survey was the awareness of the video tutorials as a learning aid. The participants reported that the tutorials helped them to understand the course material better, even if there is still room for improvement here, as there were also participants who did not see any improvement

compared to the previous semester. Many participants had the feeling that they could determine their own learning rhythm and that they could acquire the learning content flexibly in terms of time. This flexibility is a key advantage of digital learning formats and may have contributed to the positive evaluation of the tutorials. The structure of the video tutorials was also rated positively. The participants felt that the tutorials were clearly structured, which made the content easier to understand and follow. Most participants expressed a desire for more video tutorials, which indicates that the demand for digital learning material is high. Another interesting point is the perception of the flipped classroom concept. Many participants would welcome it if other lectures were also organised according to this concept, in which theoretical content is provided digitally in advance to allow more time for practical work and discussions. This shows that the participants recognise and appreciate the added value of this teaching method.

The positive assessment of the discussions with the lecturers during the workshop time is particularly noteworthy. Most participants agree that these interactions are helpful to better understand certain content. This underlines the importance of personal exchange and questions to deepen the learning process.

The view of the tutorials as a structural support for the workshop work is divided. While 50 % of the participants perceive a clear or mostly clear structure, the other 50 % are neutral. This result could indicate that the tutorials do not address different needs equally and that there is potential for optimisation here.

There was mixed feedback regarding the time burden of the video tutorials. Some participants felt that watching additional tutorials before the workshop time was time-consuming, while others felt that the length of the tutorials was appropriate. These different views could be due to individual differences in scheduling and learning behaviour. Regarding the use of tutorials for preparation and follow-up, it can be seen that they are used regularly. These figures show that the tutorials are seen as a valuable means of deepening and repeating learning.

The video tutorials were largely well received and were a useful addition to the learning process. The high level of appreciation of the lecturer's discussions also underlines the importance of personal discussion and support in the teaching process, where video tutorials can only serve as a supplement in the practical training of conservators. This balanced approach ensures that the tutorials are a useful tool, while maintaining the high standards essential to conservation practice.

4.2 Metrics of the YouTube channel “Papier Restaurierung”

It was decided to make the tutorials available on YouTube as an open educational resource (see chapter 3.5.9) under the CC BY-SA 4.0³⁰ licence, to continue the idea of free sharing of educational material in conservation. The main reason for publishing the videos on YouTube was to make them easily accessible to students, but also to share subject-specific content among colleagues. The alternative would have been to only make the videos available to students internally, for example via internal learning platforms. However, experience has shown that specialised material such as literature or videos are often passed on among students and colleagues without lecturers having any influence over them. This is now clearly regulated by the publication as OER and it is expressly desired that the videos are accessible to a wider public. Even non-experts are sure to recognise that the tutorials have a high academic standard and are thus made aware of the profession of conservators.

The first tutorials were published in March 2024. Within a year, all 27 videos first in German and later English and the 10 YouTube shorts were uploaded to a dedicated channel <http://www.youtube.com/@papierrestaurierung>. The videos were uploaded gradually, initially at a higher frequency and later one video was uploaded per week. The reason for this was that the German videos were to be made available to the students in the second semester first, in order to test the videos in the flipped classroom concept. In March 2025, the YouTube channel had 485 subscribers³¹. All videos together have a total of 33,957 views. Among the German videos, the video “Kaschieren von Papier” (“Lining”) has the most views with 1188, among the English videos it is “humidification of paper” (“Befeuchtungsarten von Papier”) with 941 views. As the individual videos went online gradually, it is difficult to make a comparison between the individual videos. However, it can be stated that the Shorts created by the students, such as “Stumpfe Klinge am Schärffix” with 5294 or “Pappecken ergänzen” with 5220 views, functioned well as “advertising” for the channel, as these short videos were suggested to a larger number of viewers in the YouTube Reels. The channel’s trailer had the highest click-through rate of impressions³² at 10.3 %. This has to do with the fact that the

³⁰ creativecommons.org/licenses/by-sa/4.0/legalcode.de.

³¹ All numbers from the YouTube channel „Papier Restaurierung“ are taken from the YouTube Analytics tool integrated in YouTube Studio. The individual viewing figures for the individual videos can be found in the appendix D1-D5.

³² Click-through rate (CTR) refers to the percentage ratio between clicks and impressions ($\text{CTR} = \text{Clicks/Impressions} \times 100$) and serves as a key performance indicator for the effectiveness of online content.

channel was advertised in a professional environment among conservators, for example at specialist conferences. Unsurprisingly, most of the channel's viewers came from Germany with 18,203 views, followed by the USA with 1588. The rest of the viewers are spread across various countries worldwide, such as Austria, Switzerland, the UK, the Netherlands, but also Tanzania and Australia.

It is difficult to say to what extent students of conservation, specialised colleagues or non-experts watch the videos. As a comment under the English video on „Remoistenable tissue“, a conservation student wrote: „This was very useful! I'm a conservation student about to make these for the first time, a detailed instruction video like this is exactly what i needed.“ (*remoistenable tissue*, 2025), which indicates that it is already finding the right audience and thus once again shows the importance of video as a medium for paper conservation.

4.3 Conclusion

The Duden dictionary gives the following definition of „*Erklärvideo*“: „*einen bestimmten Sachverhalt, Vorgang o.Ä. erklärendes, erläuterndes Video*“ (Dudenredaktion, 2024) (translation by the author: „*a video explaining a certain fact, process or similar*“). This suggests that there is a general consensus on the simple definition of a video tutorial and that the majority of people have probably watched some of them. YouTube and various social media platforms are full of how-to videos and video tutorials on a wide range of topics, with varying lengths, target audiences and levels of quality. What printed manuals were before the internet age are now video tutorials on YouTube. The application of video tutorials in professional education is illustrated for example by recent research in midwifery education (Bernhardt, Rietzke and Grieshop, 2022), Their study identifies crucial elements for effective educational videos: concise length (under five minutes), clear language, minimal distractions, and curriculum integration. The research shows the importance of maintaining professional standards while creating engaging content. In cultural heritage education, particularly conservation, the development of video tutorials remains relatively unexplored in academic literature.

When examining this project through the lens of explanatory video theory, it aligns with Wolf's (2015, p. 122 f.) typology, particularly within the Non-Fiction category where video tutorials serve as step-by-step guides designed to enable viewers to replicate, in the case of the „Jigsaw teaching project“, specific conservation techniques. He provides a „Typology of

explanatory films“ (Fig. 44), distinguishing between Non-Fiction and Fiction formats. For this context, the focus is on the Non-Fiction category, with special focus on video tutorials, but it also includes performance videos, explanatory videos, video blogs, educational films, and documentaries. Video tutorials are characterised by their methodical approach to teaching specific skills or procedures. They provide viewers with clear, sequential instructions that can be followed to achieve a particular outcome. Unlike performance videos that merely demonstrate a skill without didactic elaboration, video tutorials are explicitly designed with the learner in mind, offering guidance that enables replication. They typically break down complex processes into manageable steps, often including visual demonstrations accompanied by verbal explanations. Video tutorials can transform abstract concepts into concrete actions, making them especially valuable for teaching conservation techniques or other hands-on skills. The effectiveness of video tutorials lies in their ability to show rather than just tell, allowing viewers to observe techniques that might be difficult to convey through text alone.

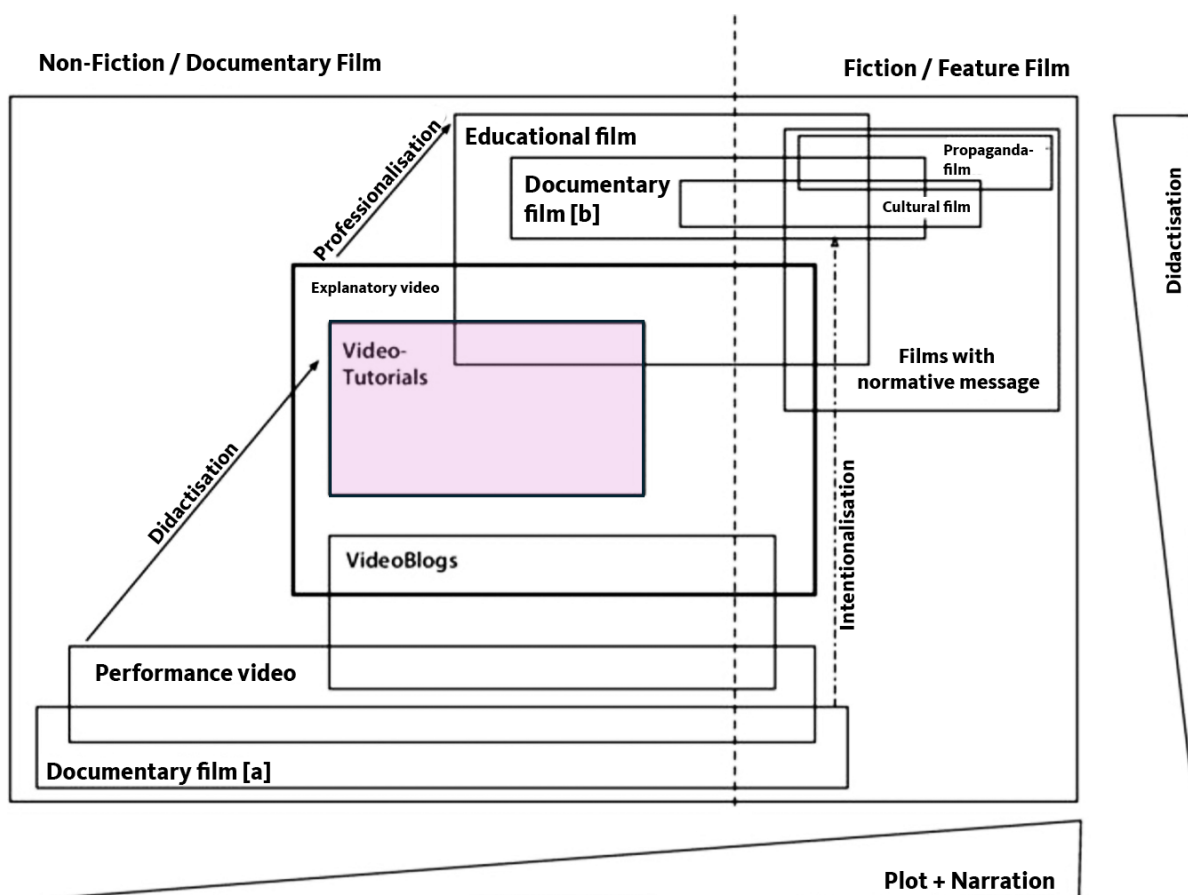


Figure 44 Presentation of the typology of explanatory films according to © Wolf (2015), terms are translated by the author.

The “Jigsaw teaching project” also takes into consideration Nitsches (2020, pp. 37–38) definition of explanatory videos characterised by six specific criteria. Their primary purpose is to explain a topic in a *clear and concise* manner, differentiating them from entertainment

films or commercials. The conservation video tutorials are all clear structured having an intro and outro. Different steps in the videos are marked by text animations in between giving it a guideline for transferring the content into the practical work. Explanatory videos frequently employ storytelling techniques to *evoke emotions*, which helps to anchor the content more firmly in the viewer's memory. The "silverfish" animation in the tutorials is an example for this, as it evokes a positive response and helps to remember the shown information's. The use of images and narrative elements can make video tutorials more persuasive than text alone, and evoke stronger emotional responses, which is particularly beneficial in fields like marketing and education (Vogel, Dickson and Lehman, 1986). The entertaining nature and clear format of video tutorials also increase their shareability, thereby extending the reach of the conveyed information (Türkay, 2016). To ensure the topic is easily understandable for the target audience, video tutorials *simplify complex subjects* as much as possible. This is a fact that the conservators struggled with during the creation of the video tutorial. It was clear that when creating tutorials for conservation education, students shouldn't be cognitively overloaded with content, but on the other hand, the content should thoroughly capture the essentials of one topic. During the creation process it was sometimes decided to make two videos out of one. This is one of the reasons why this tutorial stands out from other conservation tutorials, as it was narrated throughout the process by professional conservators, a designer and the media office. It was also clearly communicated to the students that the tutorials are always an addition to the regular lectures and demonstrations (see chapter 5.1.2). Each video should be designed to focus on a *single topic*, ensuring clarity and focus, as it was done with the video tutorials as well. A notable feature of explanatory videos is their *efficiency* in conveying information. This is achieved by optimising the use of cognitive resources and minimising learning time. In the conservation video tutorials this is achieved by breaking down complex topics into manageable parts or use animations as visual aids. A clear and precise language did prove helpful in the context of distributing conservation techniques. Additionally, an effective video tutorial should not only inform but also *encourage viewers to take action*, whether it be through a call to purchase or motivating further engagement with the topic. In the tutorials this was mostly done by advertising the videos in the lectures. The videos themselves were filmed from the perspective of a conservator, which makes it easier to identify with the subject and encourages imitation.

The data of the YouTube channel „Papier Restaurierung“ align with findings by Guo *et al.* (2014) and Beutemps and Bresges (2021) regarding video engagement factors. Guo *et al.*

study on the edX platform³³ identified several key factors that influence student engagement. Their research showed that shorter videos, specifically those under six minutes, generate significantly higher engagement levels. The Shorts, not more than 60 s in lengths, from the conservation tutorials are viewed more often than the “normal” video tutorials, which is part of the YouTube algorithms but also because shorter videos are easily to digest and can be viewed in between tasks for example. It was also found that videos featuring both an instructor and visual aids prove more engaging than those relying solely on visual content, which is also true for the conservation tutorials as it was explained before. The study showed that high-end studio productions proved less crucial than previously assumed; instead, informal settings where instructors appear relaxed and maintain eye contact showed better engagement. This is a statement that could not be fully reproduced in the conservation tutorials. All participants as well as the students found a clean technical realisation very important, which also contributed to the understanding of the content.

Complementing these findings, Beautemps and Bresges study of educational YouTube videos identified six crucial elements for success: structure, reliability, quality, community integration, presenter presence, and topic selection. Their research, involving over 5,000 participants aged 9 to 72, determined that videos between seven and fifteen minutes work best, provided they maintain a clear structure with defined introductions and conclusions. This YouTube-focused study highlighted several additional factors: the importance of citing sources (valued by 70 % of participants), the preference for real footage with narration over animations, and the value of community engagement through interactive elements. The research also revealed that while 92 % of viewers watched videos on familiar subjects, attracting interest in new topics proved more challenging. Both studies stressed the importance of thoughtful pre-production planning and authentic presentation styles. Suggesting also for the conservation tutorials that success lies in combining engaging presentation with clear structure and reliable content.

The quantitative data from the YouTube metrics provides further evidence for the argument that well-designed conservation video tutorials fulfil a previously unrealised educational need in conservation and suggests the potential for the development of a global resource library of conservation techniques. The conservation tutorials can be regarded as a significant extension of the Book and Paper Group Wiki (BPG), a resource which is sponsored by the American Institute for Conservation (AIC) (2009) and viewed as a standard source for explanations on

³³ An online learning platform founded by Harvard and MIT: <https://www.edx.org> (accessed 03.01.2025).

conservation techniques. The video tutorials will be linked with the BPG Wiki³⁴ soon. They represent a forward step in the development of the Wiki, ensuring its continued relevance and accessibility in the 21st century as videos are considered as motivating formats that correspond to the current media usage habits of learners (Findeisen, Horn and Seifried, 2019). Empirical studies also demonstrate positive effects of educational videos on cognitive factors such as knowledge acquisition as well as on non-cognitive factors such as motivation, attention, and engagement (Brame, 2015; Findeisen, Horn and Seifried, 2019). This applies to both the reception of educational videos and the production of videos by learners themselves as it was done in the “Jigsaw teaching project”. The project’s systematic approach – from initial assessment to content design – provides a valuable model for other institutions considering similar projects. In particular, the results of the student survey highlighted the importance of tailoring content to learner’s needs and preferences, underscoring the value of short, focused videos that address specific conservation techniques and challenges. High quality production, clear instructional design and integration with hands-on learning experiences reflects best practice in conservation video tutorials.

The multilingual approach of providing tutorials in both German and English extends the project’s reach beyond local boundaries, which was one of the key goals of the project to make the tutorials also available beyond the German language area. Otherwise using the tutorials in international teaching context wouldn’t be possible. For a broader outreach of the tutorials beyond the western perspective it is planned to translate these into more languages if possible.

The development of standardised video teaching content as part of the project is helping to address one of the biggest challenges in conservation education: the provision of consistent, high quality teaching content for different aspects of the curriculum. By creating a collection of reliable, professionally produced video tutorials, the work contributes to the adoption of standardised practices that can benefit students and, beyond that, the entire conservator community. In response to the research question, “What role can video tutorials play in the education of paper conservators?”, the evidence indicates that video tutorials offer valuable visualisation capabilities, particularly for demonstrating practical conservation methods. It’s a key factor in effectively bridging the gap between theoretical knowledge and practical application, a challenge that would be difficult to address through textual means alone. Furthermore, the tutorials facilitate flexible and individualised learning, enabling students to progress at their own pace and revisit complex procedures as required. A further important

³⁴ Personal message by email from the coordinators of the BPG.

aspect is the ability to build up an archive of reliable learning resources through professionally produced tutorials. This aspect is helping to establish consistent practice in the conservation field and is addressing the challenge of standardisation in education. The objective and challenge are for lecturers to use these video tutorials in a flipped classroom concept (see chapter 3.5.7). Lecturers will provide guidance during the semester, indicating which videos should be viewed in relation to the topic currently being covered. This will then be followed by a discussion, which will serve to enhance and expand the knowledge acquired through the video. The process requires active participation, problem-solving, and engagement, which mirrors the active learning environment fostered by the flipped classroom model used in this project. Students engage with the material actively, navigating through the modules that interest them the most, thereby constructing their own learning experience. They can focus on areas of personal or professional interest, reinforce existing knowledge, or explore new areas within conservation, as it is shown in the next chapter. The results of the Research Findings (chapter 4.1.4) show the students general positive assessment of discussions with lecturers which confirms that these video tutorials function best as supplement rather than a replacement for traditional teaching methods. Lecturers are more of a mentor, guiding the students towards relevant video content aligned with current topics, followed by discussions that enhance the knowledge acquired through the videos. This creates an active learning environment. The mixed feedback regarding time burden suggests that the integration into the course schedules should be more considered in the future.

5 Research subject

This chapter examines educational approaches in paper conservation, exploring how digital pedagogies and cultural contexts influence professional training. The primary research question: “What role can video tutorials play in the education of paper conservators?” was addressed in chapter 4 and this chapter will provide a more in-depth exploration of the subject. The second research question: “How can teaching methodologies in paper conservation be culturally adapted to ensure effective knowledge transfer between Western and non-Western educational contexts?” is attempted to be answered in this chapter. The research subjects address the role of video tutorials in conservation education and investigate methodologies for effective cross-cultural knowledge transfer between Western and non-Western educational contexts.

The first subject is based in Germany with a particular focus on the Cologne Institute of Conservation Sciences (CICS) at the University of Applied Sciences Cologne and the second in Tunisia with the Kairouan Manuscript Project (KMP) at the University of Hamburg. The two subjects represent two spectrums in the training of conservators, in this case in the specialisation of paper conservation. The CICS represents training in an industrialised country, where training has been based at the university since the 1980s. The KMP supports the training of Tunisian conservators at the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM). In Tunisia, training in paper conservation is not provided at universities, so the training is carried out directly in the workshops by passing on knowledge from experienced conservators or through short workshops taught by experts from Tunisia and abroad.

Following a contextual overview of each institution’s historical development and educational structure, the chapter presents an analysis of specific training scenarios. This comparative examination is grounded in research data from structured surveys at CICS (see chapter 4), interviews with lecturers and students, and observations of educational practices.

5.1 Cologne Institute of Conservation Sciences – Germany a European example

In 1986, the Ministry of Science and Research in Düsseldorf granted approval for the establishment of a degree programme in conservation and restoration in Cologne. Since 1967, repeated attempts had been made to establish a degree programme, but these were initially unsuccessful due to disagreements between the state and the city. The conservation of

paintings had already been established at other universities as a branch of artists training, whereas craftsmen such as bookbinders were more likely to undertake conservation work on paper. However, the calls for training based on scientific principles grew increasingly insistent, leading the professional associations of conservators to publish the so-called “Rosa Papier” (Braun, 2018, p. 4). This underscored the necessity for contemporary training for conservators at the university level to effectively address the challenges associated with the preservation of artistic and cultural heritage. In 1982, a new inquiry was submitted to the NRW state parliament under the leadership of Karl Lange von Stocmeier, then Chancellor of the Cologne University of Applied Sciences. By 1984, a finalised draft of the conservator training programme was available for review. In 1986, the ministerial decree for the foundation of the course was issued, encompassing the following areas: paintings, sculptures and painted surfaces, textiles, written material and graphics, and cultural-historical objects. The first dean was Knut Nicolaus, who was also Professor of Painting Conservation. In the following 2-3 years, the study programmes wooden objects, wall painting and stone were also established (Krupa, Klassen and Nögler, 2011). Since 1989 the study programme of written documents, graphic, book illumination and photographie³⁵ (SGBF) exists and has been located at Ubierring 40 in Cologne’s Südstadt district since 1991, making it one of three degree programmes in Germany, alongside the State Academy of Art & Design, Stuttgart and the University of Applied Sciences and Arts in Hildesheim, where paper conservation is taught. In 2002, the entire institute was renamed the Cologne Institute of Conservation Sciences (CICS).

Since then, the degree programme has continued to evolve. One of the biggest changes was the Bologna reform in 2007, which established the 3-year BA degree programme and the 2-year Master’s degree programme that are still valid today. In principle, the conservation degree programme should have a balanced ratio of theoretical and practical content, with the theoretical content also including accompanying subjects such as natural and cultural sciences. Not only have there been structural changes, but teaching concepts have also been continually adapted – one of the biggest changes in this regard was probably triggered by the COVID-19 pandemic, but different lecturers also use different concepts in their teaching.

The following subchapters deal with the general concept of modern teaching method at the University of Applied Sciences Cologne and in the study programme of SGBF.

³⁵ In German: „Schriftgut, Grafik, Buchmalerei und Fotografie (SGBF).

5.1.1 Concepts of digital teaching at TH Köln

As Germany's largest university of applied sciences, TH Köln has been promoting the digital development of teaching through various projects and initiatives before COVID-19, but especially during and after the pandemic. There are three position papers that contain the TH's self-image in relation to digitalisation: The University Development Plan (Hochschulentwicklungsplan) 2030 (HEP) (Präsidium TH Köln, 2018), the Teaching and Learning Culture of TH Köln – Strategic Guidelines for Teaching and Studying (TH Köln, 2018) and the Digitalisation Strategy for Teaching and Studying 2025 (TH Köln, 2020a)³⁶. HEP 2030 sets out the strategic developments up to 2030. As part of its educational mission, TH Köln qualifies its graduates for responsible jobs in an increasingly digitalised and internationally networked professional world. Numerous awards attest to TH Köln's pioneering role in the development of innovative university didactic concepts. In this context, it is important to further exploit the potential of digitalisation, particularly in the areas of teaching and knowledge transfer. The improvement of digital information infrastructures and the further development of digital teaching and learning formats are at the centre of this. The university plans to establish digital teaching as an integral part of the teaching and learning culture, whereby courses can be accessed at any time and from any location. Digitalisation is changing the campus as a place of learning. Face-to-face teaching is increasingly being supplemented by research and project-based formats, while informal learning opportunities are gaining in importance. The concept of seamless learning³⁷ is also taken into account in order to provide students with a continuous learning process (Präsidium TH Köln, 2018, p. 28).

The Teaching and Learning Culture of TH Köln – Strategic Guidelines for Teaching and Studying has published strategic guidelines for teaching and studying that focus on the integration of digitalisation into the education system and specifies the guidelines for good teaching mentioned in the HEP in relation to digitalisation. These guidelines underline the importance of using digital formats alongside traditional face-to-face learning methods. The guidelines advocate the use of blended learning scenarios and digital examinations to support individual learning pathways. The guidelines also strengthen the importance of using and

³⁶ Translation by the author from German: „Der Hochschulentwicklungsplan 2030 (HEP), die Lehr- und Lernkultur der TH Köln – Strategische Leitlinien zu Lehre und Studium und die Digitalisierungsstrategie für Lehre und Studium 2025“.

³⁷ Seamless learning is a learning concept that aims to enable continuous learning across different contexts and technologies. The aim is to ensure that students are not interrupted in their learning flow.

extending digital processes, tools, applications and information sources, such as Open Access or Open Educational Resources (OER), to further enhance the learning experience (TH Köln, 2018, p. 11).

The Digitalisation Strategy for Teaching and Studying 2025 was drawn up to supplement the two previous documents. In view of advancing digitalisation, degree programmes must be designed in such a way that they equip students with the necessary skills for the digital world. This includes the confident use of digital tools and the ability to collaborate in networked structures. Teaching and learning scenarios at TH Köln, such as problem-based, project-orientated and research-based learning, promote the critical use of digital technologies and reflection on digital changes in society and the working environment. Video recordings, flipped classroom, game-based learning, augmented and virtual reality etc. enrich these scenarios to support sustainable learning processes. The degree programmes are continuously adapted to the requirements of digitalisation in order to impart both subject-specific and interdisciplinary skills. Measures to embed digital literacy include the development of digitally supported teaching concepts, support in their implementation and the qualification of teaching staff, for example through workshops and training courses (TH Köln, 2020a, pp. 3–6).

During the COVID-19 pandemic, the university had to switch to a purely digital semester very quickly. The digital infrastructure had to be expanded and extended, and teaching concepts had to be reorganised. Overall, this went well, partly because the university reacted quickly, for example by purchasing licences for Zoom or ramping up server capacity. The media office at TH Köln was also able to provide quick support, e.g. in the production of educational videos. This infrastructure is still in place today and people are still benefiting from it even after the pandemic (Grosch, 2020). The “Lehrpfade” a new website at the TH offers a practical self-learning programme on tools, methods, theories and teaching strategies to support teachers and university staff in the development of innovative university teaching. Multimedia articles enable users to familiarise themselves with suitable teaching tools, deepen their didactic skills and understand theoretical concepts at TH Köln (Zentrum für Lehrentwicklung, no date). Which is a great tool to easily get inspiration for one’s teaching. However, during the pandemic there were several downfalls while trying to adapt the teaching methods to a purely digital format.

For example, lecturers at the TH repeatedly reported that direct contact with students cannot be replaced in digital format. Students often did not switch on their cameras during the online sessions, which made it more difficult to get feedback. It was also more difficult to supervise

students during their semesters or final theses, especially in the degree programmes that have a high practical content like conservation. Pure technical difficulties such as a poor internet connection also occurred more frequently than expected and, last but not least, the emotional stress that students were exposed to during this time had a strong impact on their motivation to study. In the conservation programmes ad hoc videos were made on examination methods on the object or ‘care packages’ were packed for practical exercises at home, which made it possible to work with dummies using simple means (TH Köln, 2020b). Nevertheless, nothing can replace on-site teaching on the original objects and purely digital teaching in conservation is not possible, but practical teaching can be well supported in this respect, for example by making instructional videos (see chapter 4) for illustration which can then be used in the flipped lab principle (see chapter 3.5.7).

5.1.2 Video tutorials in book and leather conservation training

This chapter builds on the findings of chapter 4.1.4, with a particular focus on the analysis of student learning experiences with the Jigsaw teaching tutorials. It examines book and leather conservation training in more detail during the second Bachelor semester, from the summer semester of 2024 as a flipped classroom model. As previously mentioned, the conservation of books and leather involves the examination of a diverse range of materials, including paper, wood, leather and metal. Bookbinding knowledge is beneficial.

First a rough plan was made for the whole semester including which video tutorial were to be shown and when. It must be borne in mind that the practical semester work cannot take place in one go but is always interrupted by other modules and lectures. A detailed timetable provides students with an overview of the semester, although this is deliberately kept flexible during the weeks of practical work to be able to react to the working speed of the students. The following table 1 provides an overview of the planned practical weeks in the semester, with the last column also showing the video tutorials. In total there were six continuous weeks (3-4 days per week) of practical work during the semester plus a few single days scattered throughout the semester. The table only show the weeks and days where the video tutorials should be watched beforehand. The assignment for watching the videos were send out one week before the actual practical work, which gave the students enough time for preparation.

dates	Planned practice	Video tutorials
01.04.-05.04.2024	Course on the conservation of paper files	- Conservation binding - Sewing Frame - Stitching on Sewing Support - YT Short: the knot when stitching
07.05.2024	Tool care and skiving leather	- How to sharpen a leather-paring knife - Skiving Leather - YT Short: Blunt Blade Schärffix
06.06.2024	Dry cleaning books	- YT Short: dry cleaning protection
KW 26 (24.06.-28.06.2024)	More general videos for preparation	- Wheat Starch Paste, - Cellulose Ethers - Protein Based Adhesives - Microchemical tests
KW 27 (01.07.-04.07.2024)	- Hollow spine - Dyeing leather - Conservation leather book cover - Paper conservation bookblock	- Loss filling in paper
KW 28 (08.07.-12.07.)	Work on the book cover	- YT Shorts: Consolidate book corners - YT Shorts: conservation book corners

Table 1 Overview summer semester 2024 planned practical works and the corresponding Video tutorials.

By adopting the flipped classroom model, the “Jigsaw teaching project” implements what Tenberg (2021) describes as explanatory videos³⁸ for self-learning, which increase motivation to learn, promote collective learning, individualise learning, activate learners, and support distance learning Tenberg (2021, pp. 14–17). The student-centric approach, evidenced by the initial survey (chapter 4.1.1) and student involvement in content creation (creating YouTube shorts, chapter 4.1.3), addresses the challenges identified in conservation education research: the scarcity of high-quality conservation-specific tutorials and the prevalence of unreliable content online (see chapter 4). While the videos enhance theoretical understanding and flexibility, personal interactions with lecturers during workshop time remain essential for deepening knowledge and addressing complex conservation questions. The positive reception of both the video tutorials and the workshop discussions highlights the suitability of the flipped classroom model for the specific demands of conservation education at CICS.

5.1.3 Personal Reflection

The following considerations are based on the author’s personal impressions and are therefore formulated from a subjective perspective. The introduction of digital or hybrid teaching methods, such as the flipped classroom, is proving challenging in the field of conservation training. This is due in particular to the high practical component and the often complex considerations that are required in conservation processes. While such methods are easier to implement in other degree programmes, they are only used to a limited extent in conservation. One of the main reasons for this is the difficulty of creating video tutorials that do justice to the complex conservation processes involved. Conservators tend to favour traditional methods, which makes the integration of new techniques both in practice and in teaching time-consuming. Nevertheless, it can be observed that conservation students are increasingly familiar with social media and other digital platforms and use them as a source of knowledge. This change in learning habits greatly helped with the introduction of video tutorials in the summer semester of 2024. However, the creation of these videos was time-consuming and could only be realised through a third-party funded project and the recruitment of additional staff. The active involvement of the students in the project was particularly enriching, as they often developed innovative concepts in the visual language to make the content more accessible. The video tutorials were rated positively overall, both in terms of their clarity and

³⁸ Tenberg speaks of „explanatory videos“, or in German “Didaktische Erklärvideos” which in this context is equivalent to video tutorials.

their usefulness as a preparation and follow-up tool. There is strong recognition of the discussions with lecturers as a basis. Nevertheless, watching the tutorial videos was occasionally perceived as exhausting, comparable to doing homework, which was an additional stress factor for students. This shows that communication about the benefits of such videos needs to be improved. In fact, stress can be reduced during practical workshop work, as uncertainties – such as in the production of adhesives – can be clarified independently and without delay by watching a video tutorial.

Initially, there was concern among the students that the practical part of the training would be completely replaced by videos. However, this concern was quickly dispelled by allowing sufficient time for face-to-face discussions and demonstrations and ensuring that the lecturers were always available. The integration of the videos adds an additional level to the lessons, which was perceived positively. However, the structuring function of the video tutorials could be further optimised in order to achieve a more uniform perception. It can be seen that the integration of digital teaching methods in the field of conservation not only represents an adaptation to changing learning habits but also has the potential to promote students independence and enrich the lessons.

5.2 Kairouan Manuscript Project – Tunisia a northern Africa example

Tunisia looks back on a lively history of colonisation by France from 1881 to 1956 (Bundeszentrale für politische Bildung, 2016). In 1881, Tunisia became a French protectorate and was integrated into the French economic structure. After years of resistance, Tunisia finally gained independence from France on 20 March 1956. This period still characterises the interaction between the West and Tunisia today. A turning point in Tunisia's recent history was the 2011 revolution, which began as part of the Arab Spring. The mass protests led to the overthrow of long-time President Zine El Abidine Ben Ali. This marked the beginning of a democratic transition process that positioned Tunisia as a role model for other countries in the region (Loimeier, 2022, pp. 50–55). With a rich cultural heritage and a strategic location, Tunisia remains an important player on the international stage. Tunisia is the only North African country where the Arab Spring has led to a change in democracy (de Fazio, 2023) and

is regarded as an emerging country³⁹ in this area. Tunisia is also listed as emerging country on the so-called DAC (the Development Assistance Committee) list⁴⁰ (OECD, 2024).

The Kairouan Manuscript Project (KMP) represents a major international initiative dedicated to the preservation and conservation of Islamic manuscripts in Tunisia. Led by the Centre for the Study of Manuscript Cultures (CSMC) at the University of Hamburg, the project has been working closely with the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) in Raqqada, Kairouan, Tunisia, since 2018. This institution, which is affiliated to the National Heritage Institute (NHI) of Tunisia, houses one of the largest and most important collections of Islamic manuscripts in North Africa. These include numerous early and historically valuable documents that are of inestimable value to the cultural heritage of the region (MacLaren and Börngen, 2023).

The main objective of the KMP is to improve the care, management, research and promotion of this valuable collection. Thanks to generous funding from institutions such as the University of Toronto, the Barakat Trust and of course the CSMC, a number of activities and programmes have been initiated. A central component of this is the creation of scholarships for young conservators. These scholarship programmes offer young conservators the opportunity to learn from the experienced experts at the NLPCPM in a multi-year programme. The interns training involves close collaboration with the NLPCPM's experienced conservators who already have or are about to retire. Through this collaboration, the young conservators can acquire valuable knowledge and skills in manuscript conservation, which are crucial for the long-term preservation of Tunisia's written heritage. The KMP offers the staff not only practical training opportunities but also access to specialised courses led by international experts. These courses cover topics such as the management of archives, archaeometric analysis of written artefacts, pest management and special conservation treatment techniques. The project also promotes global networking among the interns through participation in international conferences. These connections allows the young conservators to share their knowledge beyond local borders and achieve a global impact (KMP, 2020).

³⁹ The classification of countries into developing countries, emerging countries, and industrialised countries is based on various criteria, with Gross Domestic Product (GDP) per capita playing a central role. This measure indicates the material wealth of a country. The World Bank categorises countries based on their Gross National Income (GNI) into low-income countries (LIC, up to \$1,045), middle-income countries (MIC, \$1,046 to \$4,125 for lower-middle-income and \$4,126 to \$12,735 for upper-middle-income), and high-income countries (HIC, over \$12,736). Developing countries with advanced industrialisation, which are progressing through economic dynamism and export-oriented growth to overcome the typical characteristics of developing countries, are called emerging countries (Bundeszentrale für politische Bildung, n.d.).

⁴⁰ The Organisation for Economic Co-operation and Development (OECD) regularly publishes a list, the so-called DAC list (the Development Assistance Committee). It divides countries into different categories based on their income and level of development, such as "least developed countries" or "middle-income countries". The Deutsche Akademische Austauschdienst (DAAD) also refers to this list.

Against this backdrop, the next chapter offers an insight into the development of cultural heritage protection in Tunisia and look at the history and the training of the young conservators at the NLPCPM.

5.2.1 Understanding the development of cultural heritage conservation in Tunisia

There are few publications dealing with the preservation of cultural heritage in Tunisia. A general overview is provided by the document on cultural policies in Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria and Tunisia, published by Cultural Resource (Al Mawred Al Thaqafy)⁴¹, the European Cultural Foundation and Boekmanstudies (Al Khatib *et al.*, 2010).

The evolution of cultural heritage conservation in Tunisia is closely linked to the country's broader cultural policy development. Following independence in 1956, Tunisia's cultural policy focused on fostering national unity through a shared identity. The establishment of the National Fund for Culture marked a significant milestone, providing support for various cultural initiatives. In the latter half of the 20th century, the emergence of countercultural movements and political opposition led the state to adopt a more inclusive cultural policy. It also placed greater value on preserving historical sites and cultural landmarks as symbols of national pride. Cultural policy continued to expand under President Ben Ali's administration, with the National Plan of the 1990s enhancing cultural and heritage infrastructure. The 1994 Heritage Code, aligned with UNESCO guidelines, provides the legal framework for heritage management, though there are growing calls for its revision, particularly regarding natural heritage site management. The National Heritage Institute (NHI), which evolved from the National Institute of Archaeology and Art, maintains exclusive control over heritage management and has expanded its expertise and specialised centres throughout the years (Belgacem, 2010).

Several key organisations emerged to protect Tunisia's historical sites, notably the Association de Sauvegarde de La Médina de Tunis (ASM), which focuses on preserving the Medina of Tunis. However, Tunisian heritage preservation has consistently faced challenges, particularly regarding insufficient funding and maintenance. UNESCO has proposed public-

⁴¹ The Culture Resource (Al-Mawred Al-Thaqafy) is a regional, non-profit organisation established in 2003 with the objective of fostering artistic creativity in the Arab region and facilitating cultural exchange both within the region and beyond.

private partnerships as a solution for heritage preservation, an approach that shows promise in the Tunisian context. A prime example of this model's success is the Dar Ben-Gacem restoration project, a 17th-century courtyard house transformed into a boutique hotel. This initiative, launched by a Tunisian female entrepreneur during the Arab Spring, demonstrates how micro-scale projects and social entrepreneurship can effectively contribute to heritage management. Beyond preserving the buildings architectural features, it revitalised intangible aspects of Tunisian culture through active engagement with local artisans and community members. This comprehensive approach created a sustainable and socially responsible enterprise that benefits both the local economy and cultural preservation (Faleh, 2019). Tunisia has recognised that protecting and restoring its cultural heritage serves a dual purpose: preserving valuable history and identity whilst boosting tourism. Investment in the maintenance and conservation of historical sites enhances the country's appeal to visitors, generating significant economic benefits. This symbiotic relationship between heritage preservation and tourism creates a sustainable foundation that benefits both communities and the economy, whilst fostering increased awareness and appreciation of the country's cultural heritage. Collaboration with global organisations, such as UNESCO, enables access to broader resources and expertise, significantly enhancing conservation efforts. These partnerships provide substantial advantages through financial support for preservation projects and facilitate the exchange of knowledge and best practices, leading to more innovative preservation techniques. Furthermore, international collaboration raises awareness on a global scale, highlighting the importance of preserving cultural heritage and encouraging additional investment and support. Such partnerships create valuable opportunities for educational and training programmes, whilst enabling technology transfer that strengthens local conservation capacity.

The Training in Action (TinA) project is a good example for collaborative work between Tunisia and another nation in this case the UK. It was an initiative focused on improving the preservation and management of cultural heritage in Libya and Tunisia. Running from 2017 to 2019, it was funded by the British Council's cultural protection fund. The project involved 72 professionals from the Libyan Department of Antiquities (DoA) and the Tunisian Institut National du Patrimoine (INP). It was a collaborative effort with British universities, including Durham University, King's College London, and University College London. The TinA project acknowledged the need for similar approaches to heritage conservation challenges in both nations, despite their different political situations today. It adopted a comprehensive method that brought together various fields like archaeology, conservation, and heritage

studies. Training participants in documentation, conservation, and management techniques was an important part of the project as was involving communities and stakeholders for the protection and sustainable management of cultural sites. The impact of the project was visible in the increased confidence and skills of the trainees, as well as in the improved relationships with local communities through awareness campaigns. The TinA project serves as a successful example of integrated cultural heritage conservation in the MENA (Middle East and North Africa) region, providing a model for building capacity that can be adapted to the specific needs of heritage organisations in Tunisia and Libya, as well as in other regions facing similar challenges (Leone *et al.*, 2020).

Several West and North African countries share Tunisia's French colonial history, including Algeria and Morocco (Fig. 45). The development of cultural heritage conservation across West Africa reflects a complex, multifaceted process, shaped by colonial legacies, urbanisation and evolving international perspectives on heritage preservation. The region's rich and diverse heritage, formed through centuries of cultural exchange, has traditionally been protected by local communities. However, a significant disconnect has emerged between local and international preservation approaches. Formal conservation systems often conflict with traditional custodianship methods, creating tension between established local practices and modern preservation techniques. Colonial rule, particularly French administration, profoundly influenced formal conservation practices throughout West Africa. French colonial officers adopted a selective approach to conservation, prioritising monumental structures that aligned with their ideologies whilst often neglecting or destroying more modest cultural artefacts. This approach mirrored conservation practices in France itself, where post-Revolution efforts focused on democratising art and monument appreciation. Consequently, early conservation efforts in Tunisia and other Francophone countries frequently resulted in local communities becoming disconnected from their cultural heritage. This alienation created a lasting impact on heritage management approaches and community engagement in preservation efforts (Odiaua, 2022).

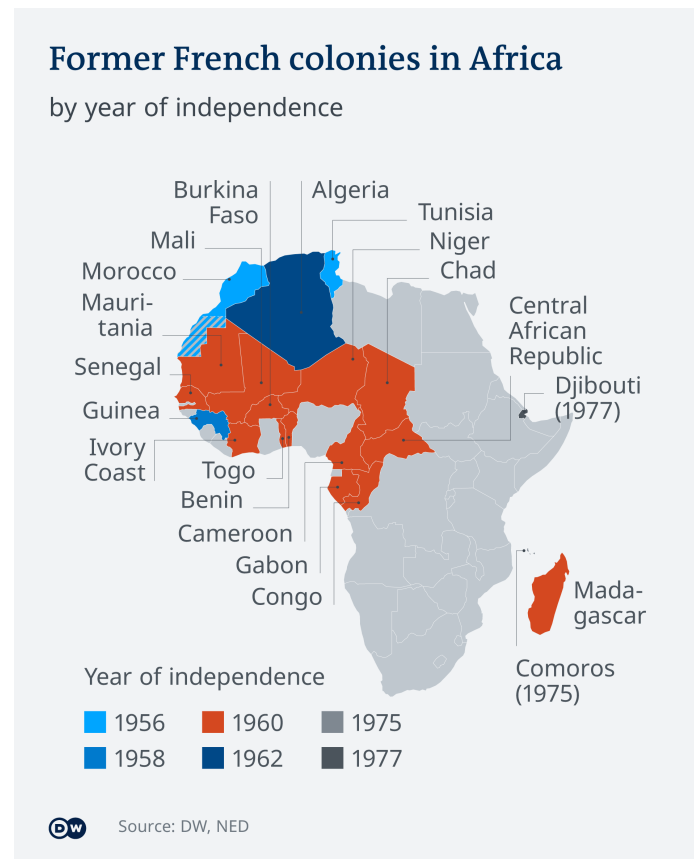


Figure 45 former french colonies and their independence, © Deutsche Welle, <https://www.dw.com/de/frankreich-und-afrika-abnabeln-in-zeitlupe/a-54245021> (accessed 09.09.2024).

Conservation in Tunisia is still strongly influenced by its colonial history and is only slowly moving away from it. To address these challenges, there has been a movement to decolonise the heritage discourse in North Africa, advocating for a shift away from Western models of conservation and towards a more inclusive approach that integrates local knowledge and practices. Both traditional and innovative methods need to be used to preserve the cultural heritage. It is notable that buildings, monuments or UNESCO world heritage sites, like the Medina in Tunis, are often promoted and taken care of for their tourism potential, while for example written cultural heritage is less likely to receive support due to its lower visibility. This shows the need for a comprehensive strategy that encompasses all aspects of cultural heritage, protecting both tangible and intangible values. Such efforts require not only local cooperation but also international partnerships to develop and implement effective and sustainable conservation practices. These international partnerships include, for example, the US Ambassador Fund, which repeatedly provides funding for conservation projects, not just heritage sites. In 2005 it funded the conservation of the photographic collections of the

Association for the Protection of the Medina of Tunis (Ambassadors Fund for Cultural Preservation, accessed 09.09.2024). The KMP is also one of these international partnerships, in this case mainly between Tunisia and Germany.

The following chapter will deal more intensively with the history of the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM).

5.2.2 History of the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM)

The National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) in Raqqada⁴², Kairouan is one of few conservation studios in Tunisia. Other studios are the one in the national library and the national archives (Ipert, 2016, p. 35). But the NLPCPM is not only a conservation studio, it houses also one of the most important collections of Islamic manuscripts. Over the centuries, Kairouan was an important centre of Islamic North Africa. Although today it is more like a small provincial town with a population of around 120,000, it developed into one of the most important holy cities after its foundation in 670 AD. It was influential until the 11th century, when trade, commerce, arts and sciences reached an unprecedented level. The city was not only a political and economic centre, but also a place of learning and intellectual exchange (Schwartz, 1992, p. 151). The medina of Kairouan, which includes the Sidi 'Uqba Mosque (Great Mosque), is an architectural masterpiece and a model for many other mosques in the Maghreb. This is why it, along with other buildings in the city, has been classified as a UNESCO World Heritage Site since 1988 (UNESCO World Heritage, no date b). The Great Mosque of Kairouan was a hub for scholars and students studying Islamic sciences and teachings. It also housed a large number of manuscripts and is thus a testimony to early Islamic scholarship (Schacht, 1967). While other collections of Islamic manuscripts have been torn apart or destroyed over the centuries, this is an almost intact collection of Islamic manuscripts from the 9th to 11th centuries (Schwartz, 1992, p. 151). Originally stored in the maqṣūra⁴³ (Fig. 46) of the mosque, it is now stored in the NLPCPM since 1983.

⁴² Approx. 7 km from Kairouan, part of the Islamic Museum, former residence of President Bourguiba.

⁴³ Enclosed space inside the mosque.



Figure 46 Inside the Great Mosque of Kairouan. At the back left of the picture, there is a small room, the maqṣūra, surrounded by a brown wall decorated with wooden ornaments. picture made at a visit by the author in 2022, ©Marlen Börngen

An inventory is incomplete, but as far as is known the collection consists of:

- more than 40,000 disbound leaves from Qur'anic manuscripts, both parchment and paper;
- more than 2,500 disbound leaves from non-Qur'anic manuscripts, primarily parchment;
- some 179 loose manuscript bindings;
- about 2,200 paper manuscript codices;
- around 150 papyri

(J. Brockop and KMP, 2022)

Even though Kairouan's importance as a scientific centre declined, there was still a growing interest in the manuscripts in the late Ottoman Empire. The collection was also to be brought together in the Great Mosque of Tunis, which the Kairouan collection was spared (Schwartz, 1992, p. 152). Muhammad Bek Bayram VI was instrumental in advancing the study of the manuscript collection. He was the one who "found" a second maqṣūra with two wooden cabinets in which the manuscripts lay tied up in parcels, unsorted and covered in dust. Even the parcels are said to have been made of gazelle skin and only gave an idea of what precious

manuscripts were inside (Bayram, 1897; as cited in Schwartz, 1986, p. 45). His 1897 article offered a modern account of this collection. Bayram's initiatives prompted local officials and scholars to collect and organise the manuscripts, drawing the attention of European historians. Notable contributions to the preservation and study of these manuscripts were made by Georges Marçais, Louis Poinssot, and Ibrahim Shabbūḥ through their significant publications (Bayram, 1897; as cited in J. E. Brockop, 2023, p. 83; Marçais and Poinssot, 1948; Shabbūḥ, 1956). Another result was the interest of the French protectorate in the collection, when Bernard Roy as Director general of the government took charge of it (al-Rammāḥ, 1996, p. 37). Following this, new cabinets were built, and an attempt was made to sort the collection, but this was only partially successful, as the condition of the manuscripts, some of which consisted only of fragments, was difficult. Manuscripts that could not be categorised were stored in "folders", in which manuscripts that were similar to each other were collected. Around 4000 photographs of the most important manuscripts were also taken around 1949 (Schwartz, 1986, p. 46).

1967 was an important date in the history of the collection, when a presidential decree was issued stating that the manuscript collections of the country's public libraries were to be centralised in the National Library in Tunis (Brockopp, 2024). Even if the storage in Tunis may be better for purely conservational reasons, it is not desirable to tear a collection out of its original context and thus out of the identity of the city of Kairouan. In 1982, a new presidential decree was issued, allowing the collection to return to Kairouan. In 1983 the collection was housed in the Raqqada Museum. The newly founded Centre for the Study of Civilisation and Islamic Art, which was headed by Ibrahim Chabbouh, formed the basis of the new conservation lab (al-Rammāḥ, 1996, pp. 38–39). A co-operation between Tunisia and the University of Göttingen began in 1985 and served to establish a conservation laboratory and train conservation personnel. Today, the workshop is run by Dr Rameh Manel under the direction of the National Heritage Institute.

This section will examine the collaboration between Kairouan and Göttingen in greater detail. It should be noted that this was not the only conservation project underway at the time. However, it is noteworthy for three key reasons. Firstly, it pioneered the establishment of a cutting-edge conservation laboratory in this region. Secondly, it facilitated the training of conservation professionals in Kairouan. Thirdly, it spanned a significant duration of

approximately seven years⁴⁴. The following information is mostly based on the file of the Federal Foreign Office in Germany in the Political Archive on the cultural aid project for manuscript conservation in Kairouan (Politisches Archiv, BAV 250-TUNI/35853, 1983). This file serves as the primary source; other sources are consulted in addition.

The project began in 1983 with a visit to Tunisia by Dr Gerd Rüdiger Puin, who was invited by Dr Chabbouh. This was due to his expertise in the Sanaa project “Conservation and Cataloguing Arabic Manuscripts”⁴⁵ from 1981-1984, on the basis of which a similar project was to be set up in Tunisia. Initial ideas, for example, centred on the training of Tunisian conservators in Sanaa. Günter Brannahl was already the technical leader of the Sanaa project and was therefore also to take on this task in Kairouan. Dr Puin took over the initial discussions with the German embassy. The first damage to the paper manuscripts was also described, such as “*Tintenfraß, Fäulnis und weiße stippchenförmige Ausblühungen*” (Translation by the author: “*ink corrosion, mould and white spotty efflorescence*”) (Fig. 47).



Figure 47 Manuscript on paper with insect infestation, taken from page 6 of Roswitha Ketzers final report, file BAV 250-TUNI/35853

Half of the titles are said to be parchment manuscripts, and there are also said to be around 50 book bindings. The premises in Raqqada are considered to be good without the need for major alterations, as there is sufficient space for stacks and workshops, with an extension to be made for a bookbindery. An old kitchen is also to be used as a wet room for the conservation work. The following picture (Fig. 48) shows the planned floor plan of the required rooms.

⁴⁴ Sometimes different time spans are mentioned, 7 years is the time from the signing of the contract to the final report of the project.

⁴⁵ Original title: „Restaurieren und Katalogisieren arabischer Handschriften“.

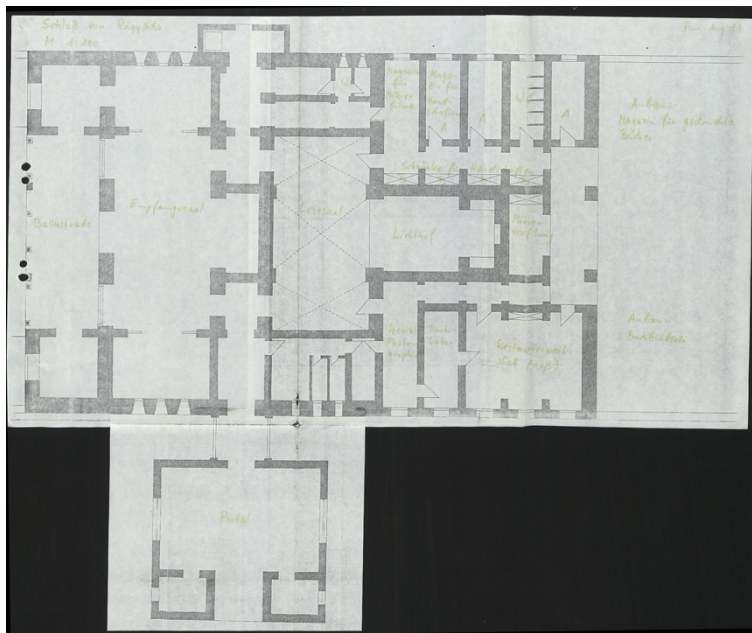


Figure 48 Floor plan of the originally planned workshop in Raqqada taken from Günter Brannahl's 1984 report, file BAV 250-TUNI/35853

Firstly, the Tunisian objective was formulated as the establishment of a model and training workshop for all branches and levels of book conservation, which would act as a signal for the entire Arab world. Young Tunisians were also to be recruited to work in the workshop and trained as book conservators. A conservation workshop was to be set up with the appropriate materials, as well as a microfilm processing laboratory. The training of young Tunisian professionals was considered a priority. In 1984, Günter Brannahl travelled to Kairouan and wrote a report which was sent to the German Embassy. He mentions 3000 manuscripts, more or less a loose-leaf collection. He describes their condition as follows: All the quires were separated by sheets of paper on which information about the manuscripts was written in ballpoint pen, and these in turn were attached with rusty paper clips. Most of the quires were flat, but there was often damage to the spine. Brannahl's examination revealed varying states of preservation, leading to his conclusion that the manuscripts had been deliberately dismantled. The first and last quires, which often showed significant damage, had been removed and categorised as fragments. Evidence suggested that the binding had been removed prior to this process, necessitating individual categorisation of each quire before conservation work could begin. The storage conditions varied significantly between the manuscripts and fragments. The main manuscripts were housed in steel cabinet drawers, whilst the fragments, which upon closer inspection were found to be damp and sticky, were stored in newly constructed wooden cabinets. Although there had been initial plans to relocate

all manuscripts to these new wooden cabinets, this transfer was halted due to concerning environmental conditions, with humidity levels reaching 73 % relative humidity (RH) at a temperature of 17.5 °C. Brannahl documented his findings with several accompanying photographs in his report (Fig. 49-52).



Figure 49 Storage of the manuscripts as a loose-leaf collection in slipcases and boxes, taken from page 6 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853



Figure 50 Storage of the manuscripts in steel cabinets, taken from page 9 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853



Figure 51 During one of Günter Brannahl's visits, he separated several clumped fragments from each other and dried them in the air. These were then stored in a better ventilated magazine, taken from page 11 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853



Figure 52 New, unsuitable built-in cupboards in which fragments were already stored, taken from page 10 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853

On 15 July 1985, the agreement between Tunisia and Germany on the conservation of Arabic manuscripts in Kairouan was signed. It contained the following points:

- Establishment of a conservation workshop up to 30,000 DM (roughly 15,000 EUR) including the training of Tunisian staff by German experts
- Donation in kind of microfilm equipment 30,000 DM (roughly 15,000 EUR)
- Training of a Tunisian expert for manuscript conservation as workshop manager in Göttingen for 1.5 years
- Training of 2 Tunisian experts for the conservation of wood, leather and other materials in Germany for one year
- Training of a Tunisian photographer for manuscript photography for 3 months
- Training of a Tunisian chemist in Berlin for 6 months
- Conservation of some special manuscripts in Federal Republic of Germany
- Donation of measuring instruments 10.000 DM (roughly 5,000 EUR)
- Initial equipment for laboratories (microfilms, deacidified paper etc.)

Günter Brannahl died in 1986 and Dr Schwartz⁴⁶ took over the project management on the German side. From 1988, conservator Roswitha Ketzer supervised the conservation work. The workshop was then set up with a photograph and microfilming lab, a restoration, preservation and bookbinding lab and a cataloguing and publishing department (al-Rammāh, 1996) and materials were purchased. In 1991, Dr Schwartz visited the workshop in Kairouan shortly before the end of the project and wrote some remarks to the German embassy. On the one hand, the workshop meets the best possible modern standards to date with a connected microfilm system. A total of 6 people has been trained; 3 conservators, 2 conservations assistants and 1 microfilming technician. According to him, this is unique in North Africa, but unfortunately this is not reflected in the wages of the Tunisian conservators. He also formulates some points of criticism, such as the fact that no catalogue for the collection is available outside Tunisia, and the catalogue on site is incomplete and does not meet scientific standards. The working conditions are not optimal, and there are not enough microfilms made to leave the original manuscripts untouched. There is also a lack of librarian supervision. In 1991, Roswitha Ketzer formulated her final report, which she also submitted in edited form as a presentation to the IADA in Sweden (Ketzer, 1991). In it, she describes the state of the

⁴⁶ He is a librarian and specialist in Oriental studies.

collection as already mentioned by Brannahl above. The establishment of the workshop was spread over 4 years. Initially, paper envelopes were made for damaged books and a water demineralisation system was set up as a major step. In 1991, the workshop consisted of a dry workroom, wet room, laboratory, dirt room and a separate dining and social room (Fig. 53).⁴⁷



Figure 53 one of the workrooms in the Tunisian lab taken from page 9 of Roswitha Ketzers final report, file BAV 250-TUNI/35853

Three Tunisians were trained as conservators in Germany and two as conservation assistants in Tunisia. The three conservators received a German language course before their training, but this was not sufficient, so Mrs Ketzer taught in French. The training of the conservators in Germany overlapped by one month. There were only male applications, and the selection criteria were several years of manual experience, family in Kairouan to avoid moving away, high school level, at least 25 years old to better cope with the German culture shock and knowledge of French. Finally, a carpenter, a photo lab technician, an electrician, a truck driver and a tourist guide were trained. Only project-related techniques from bookbinding, paper conservation, binding conservation, parchment conservation, papyrus conservation and the storage of archive material could be learnt. A large part of this also involved teaching professional ethics. Ketzer herself spent six weeks in Kairouan twice a year. The work initially focussed more on preventive conservation: recording the condition of the books, drycleaning and making boxes and cassettes to replace the old slipcases. The metal cabinets were replaced with open shelving. An extensive climate check was carried out. Various measures were taken to stabilise the climate from 35-90 % RH and 7-35 °C to 55-50 % RH

⁴⁷ al-Rammāḥ referred to 5 units: cleaning, parchment restoration and preservation, paper restoration and preservation, binding and chemical analysis. In the authors opinion they are meaning the same.

and 18-25 °C. Following a six-year period, the microfilming process has reached the point where one quarter of the collection has been digitised (al-Rammāḥ, 1996).

Mrs Ketzer also formulated a detailed conclusion in which she pointed out the initial difficulties, such as teaching in French, which is neither the native language of the Tunisians nor that of Mrs Ketzer and therefore represents a certain language barrier. The lack of experience with Arabic binding techniques also had to be learnt first by her. Similarly, the conservation of the manuscripts in Tunisia could only begin once the environmental conditions, such as the climate, were right. A major problem is the payment of Tunisian conservators, who usually earn no more than a cleaner. The procurement of conservation materials is also challenging, as most suitable materials are not readily available in Tunisia. The Tunisian public sector typically does not allocate funding for this purpose, and Tunisian customs regulations are particularly stringent.

She has calculated that with 3 conservators and an estimated 1,400 books and a treatment time of 10 weeks per book, it would take around 95 years to conserve the collection.⁴⁸

The difficulties faced by Tunisians when working abroad were highlighted in the report. One challenge mentioned was the culture shock experienced by Tunisians in Germany, particularly in relation to the differences in manners between men and women, eating habits, and language barriers. Tunisians tended to socialise primarily with other Arabs, either in the language course or in the local mosque, as it provided a strong connection to their identity. It was noted that one intern who was not a practising Muslim struggled to find a connection. Upon returning to Tunisia, the interns faced another culture shock when they realised the low salaries in their own country compared to the higher salaries in Germany, leading to wastefulness and chronic debt in the time of their internship. For future projects, Mrs Ketzer suggests training conservators in their own country. Rather than focusing on individual conservation training courses, Al-Rammāḥ (1996) recommends the establishment of three or four institutes in different Islamic countries to deal with the restoration of Arabic manuscripts.

In conclusion of this subchapter there are some conspicuous features. Firstly, there is the difference in the number of manuscripts that appear in the various references, ranging from only 125⁴⁹ manuscripts (Shabbūḥ, 1956) to 44,000 Qur'anic disbound leaves and 48,000 non-Qur'anic leaves plus 381 documents (Brockopp, 2024). The reasons for this could be many, on the one hand the collection does not only contain manuscripts from the “old mosque” but

⁴⁸ al-Rammāḥ referred to 30 years, and he says already 4000 folios out of 10.000 folios on parchment are conserved, for books he estimated more than 50 years.

⁴⁹ whereby several texts are summarised.

has grown over time with manuscripts from other mosques and private collections. The staff distinguishes between the “ancient library” and the “scholarly library,” with the former originating from the Sidi ‘Uqba mosque. However, the boundaries between the collections might be blurred, as early endowments came from scholars, not just the mosque, indicating a shared public-private storage system. There is therefore an urgent need for an up-to-date inventory that not only records the number and content of the manuscripts but also documents the damages on the manuscripts.

In 1991, the conservation workshop in Tunisia had advanced equipment and well-trained conservators, which was rare in North Africa. However, the challenge lies in maintaining the workshop’s state-of-the-art status and keeping up with the latest conservation findings, as well as passing on this knowledge to future Tunisian conservators. This is difficult due to the frequent staff turnover in the laboratory and the National Heritage Institute, making long-term planning and collaboration challenging. Language barriers also hinder access to conservation science literature and further training opportunities. Additionally, low salaries for conservators in Tunisia make it almost impossible for them to travel and engage with the international conservation community. These circumstances pose significant obstacles in keeping the workshop up to date and connected with the rest of the conservation field. In this respect, time seems to have stood still in the NLPCPM in the 1990s, and after the cooperation between Germany and Tunisia, nothing has really changed, and in some respects things have even gone backwards. Conservation materials still aren’t available in Tunisia and are too expensive to import. The conservators trained in Germany are now retired and have been able to pass on their knowledge only to a very limited extent. Machines purchased under the project are no longer in working order. Challenges that the KMP project aims to address, which will be subject in the following chapter.

5.2.3 Conservation training from the KMP

In 2019, the Kairouan Manuscript Project (KMP) conducted an initial assessment at the NLPCPM, marking 28 years since the conclusion of the Federal Foreign Office-funded project between Göttingen and Kairouan. The assessment team comprised KMP Director Professor Asma Hilali, KMP member Davidson MacLaren, and conservator Ana Beny, who travelled to Tunisia to evaluate the current state of operations. Their comprehensive assessment included examining the laboratory and collection facilities, reviewing existing policies and procedures, and evaluating equipment, staff qualifications and development

requirements. The visit proved successful in establishing trust and mutual understanding between the organisations involved in the KMP. The result was a comprehensive report (Beny, MacLaren and Hilali, 2019) that provided guidance for future actions. In the various sections of the report, individual courses are repeatedly mentioned that are intended to build on each other and thus contribute to the long-term training of conservators in the NLPCPM. Courses that are mentioned are:

- *Preservation: Principles and Practices I*
- *Preservation: Principles and Practices II*
- *Islamic Codicology Course*
- *Ethical Issues in the Conservation of Islamic Manuscripts*
- *Parchment Conservation: Principles and Practices*
- *An Introduction to Islamic Binding Structures and Their Conservation*
- *Early Islamic Binding Structures: Their History, Structure, and Conservation*
- *Adhesives and Consolidants*
- *courses in imaging, possibly technical photography, i.e. IR, IRF, IRFC, IRT, RTI, UVF, and UVR photography, and multi-spectral imaging.*

In early 2020, Professor Faouzi Mahfoudh, former head of the National Heritage Institute and Professor Michael Friedrich former director of the CSMC signed a Memorandum of Understanding to support emergency preparedness training and building repairs for the conservation lab in Kairouan.

The COVID-19 pandemic significantly disrupted KMP activities and course planning. Whilst European travel resumed relatively early, Tunisia remained inaccessible until spring 2022. During this period, like many institutions, the programme adapted by shifting to digital training initiatives, including a virtual session on emergency preparedness and response, conducted by conservator Marco di Bella for the NLPCPM (Brockopp, 2020). In 2020, the KMP secured funding from Barakat Trust for a one-year internship programme at the NLPCPM. Although the pandemic delayed its launch until 2021, the programme received an extension through 2022. This enabled the employment of four interns, predominantly women, at the NLPCPM, with the specific aim of training them as conservators to meet the collections unique needs. Despite some turnover among interns during this period, the programme continued successfully. Current interns receive support from both the Old Books, New

Science Lab at the University of Toronto Mississauga (University of Toronto Libraries, no date) and the CSMC. A particularly noteworthy course was “Managing the Archive, Library, and Museum Environment”, delivered over ten weeks in spring 2022 by two distinguished academics from Cardiff University: Professor Jane Henderson, Secretary General of the International Institute of Conservation and Professor of Conservation, and Professor Phillip Parkes, Emeritus Reader in Conservation (CSMC, 2022). The course covered the following topics:

Week 1 - Value, Significance, and Mission: The Impact on Collection Care

Week 2 - The Management of Incorrect Relative Humidity and Temperature

Week 3 - Integrated Pest Management (IPM)

Week 4 - Pollution, Housekeeping and Storage Management

Week 5 - Light

Week 6 - Environmental Monitoring: Concepts and Practice

Week 7 - Emergency Preparedness and risk mapping

Week 8 - The Role of Standards and Targets in Preventive Conservation

Week 9 - Reports

Week 10 - Action Planning

The distinctive feature of this course was its thorough preparation and innovative delivery method. It employed a “semi” blended learning format, because of the ongoing COVID-19 restrictions and the extended ten-week duration, which prevented Henderson from delivering live sessions in person at Kairouan. Live sessions were conducted via Zoom, with laboratory staff gathering collectively to view the presentations on a large screen, whilst some participants also used individual laptops (Fig. 54). Henderson actively encouraged staff participation during these sessions, fostering discussions both with her and among colleagues. Prior to each session, Henderson prepared pre-recorded videos covering the designated topics. Each main topic was subdivided into approximately three fifteen-minute segments for optimal learning. Laboratory staff and interns were required to watch these videos before attending the live sessions. The course structure was supported by comprehensive weekly learning maps that included:

- Detailed listings of video topics with corresponding links
- Recommended pre-reading materials
- Preparation tasks for the upcoming synchronous session
- An overview of the forthcoming live session content

At the conclusion of each session, Henderson provided a preview of the following weeks content, enabling staff to prepare questions and materials accordingly.



Figure 54 Professor Jane Henderson delivering a lecture on Zoom, while the lab staff from the NLPCPM is present in the lab. © Wadie Missaoui

An interpreter, Jouda Zayeti, was hired for this time to translate the course materials into Arabic, so all the videos could have subtitles in Arabic. She also attended all the live sessions of the course in the lab to simulate it. Jouda Zayeti has a Master of Arts degree in Translation and Interpreting at the University of Carthage, with a specialisation in terminology related to cultural heritage. The use of a WhatsApp group amongst the participants and Jane Henderson proved to be an efficacious method of communication. The participants were able to share images in the live-session or in between the sessions of the laboratory setting, which enabled Henderson to gain a more comprehensive understanding of the circumstances on the ground. Preventive conservation represents the foundation of an effective lab, yet for those less familiar with the subject, it can prove overwhelming. The translation of the course content into the native language of the staff members was designed to address this issue. The decision to break up the purely virtual format and to hold the course on-site, with staff members meeting in person for the scheduled dates, was made with the intention of fostering a more

engaging and dynamic learning experience. The integration of a messenger service was intended to facilitate faster and more efficient communication between all participants.

In Winter 2022, a further in-person course on Integrated Pest Management (IPM) was led by Amy Crossman, founder and director of Collections Care Consultancy. Crossman holds a BA (Hons) in Conservation and Restoration and an MSc in Care of Collections, and has over twenty years of experience delivering conservation and training in international contexts, including work in developing countries such as Kuwait, the United Arab Emirates (UAE), and Myanmar. Notably, her professional background and extensive knowledge of Modern Standard Arabic, alongside deep cultural awareness in Arabic countries, allowed her to tailor her teaching approach effectively to the local context in Tunisia.

The five-day course at the NLPCPM included around 15 participants and was deliberately longer than typical UK-based IPM courses to accommodate translation, site orientation, and adaptation to local needs. The course was modular structured, offering a thorough introduction to IPM within the broader framework of preventive conservation.

The course structure included the following main topics:

- Introduction to IPM and its role in preventive conservation
- Environmental impact on insect development and pest activity, including the importance of monitoring temperature and humidity
- Identification of key pest species relevant to archives and manuscripts, and recognition of pest damage
- Practical monitoring and trapping for pests, with participants devising their own trap deployment and risk zoning using building plans
- Strategies for establishing and maintaining an IPM programme specific to the NLPCPM context
- Review of available local resources and discussion of relevant case studies

The hands-on element was integral to the success of the course: building and site surveys were conducted and participants were required to carry out practical group work, developing realistic IPM strategies for their collections. Crossman encouraged group work and responded flexibly to emerging questions, revisiting key topics as needed. Crucially, although she speaks Arabic, she also worked with an interpreter throughout due to the nuances of Tunisian dialects and the need for precise translation of conservation terminology. Resource constraints and the

realities of local infrastructure influenced the choice of methods: only basic monitoring and recording tools (such as Microsoft Office) were used, and advanced treatments like freezing or anoxia were discussed theoretically but not demonstrated, owing to uncertainty about equipment reliability. To ensure the sustainability of knowledge transfer, all participants received handouts (including a template IPM strategy) customised to the NLPCPM, and a monitoring spreadsheet for ongoing use. Crossman recommended periodic online follow-up meetings for ongoing support, particularly given the need for continued data gathering on local pest populations and collection conditions.

The experiences gained during the courses were documented through interviews, following the conclusion of the course. The following chapter will provide a more detailed examination of the findings.

5.2.4 Evaluation interviews

In the following chapter, an oral interview conducted with Jane Henderson (personal communication, 07. July 2022) about her course on preventive conservation and a written interview with Amy Crossman (personal communication, 05. May 2025) about her course on IPM were evaluated. The results of the interviews with the NLPCPM interns are also summarised below using the focus group methodology.

In the evaluation interview with Jane Henderson about the conducted course “Managing the Archive, Library, and Museum Environment”, various aspects of the execution and potential improvements for future training sessions were discussed. A central topic was the decision-making process regarding who exactly should be trained and whether the training should be confined to the lab or extended beyond it. While some of the lectures in this course were attended by participants from outside the lab, Jane Henderson suggested that in the future the training should be conducted only for the NLPCPM lab staff, while making the training videos available to a wider audience. This approach would allow a broader reach without compromising the quality of the training for those present.

A recurring issue was the intense observation by the members of the KMP team, but also by participants from outside the lab, which was seen as a barrier to the learning process.

Participants might feel like “goldfish under observation”, which was not helpful for learning in an already challenging environment. Therefore, it was recommended that the number of observers be reduced, and that each participant be given an active role in the course like moderation or writing notes. This approach would not only engage participants more but

would also address the discomfort caused by having too many non-contributing observers in the room. Regarding technical improvements, it was proposed that each participant should have access to a personal screen. This would facilitate interaction and promote communication among participants and the lecturer. Henderson noted that this measure could help balance the presence of observers from different locations while also enhancing the conversation between active participants. Of course this might be difficult for financial reasons. But she still felt during the course that the conversation between her and some of the participants were quite fruitful.

Another topic of discussion was the role of translation during the course. While the use of an interpreter was deemed necessary, there were concerns that important parts of the explanations might be lost due to inaccurate translations from English into Arabic which was mentioned by some of the senior conservators in the lab. The format of having a non-conservator translator proved particularly successful, largely due to the exceptional skills of the specific translator, Jouda Zayeti, at this course. She focused strictly on literal translation rather than providing commentary on the content. This insight challenged the assumption that a conservator would be a better translator for conservation courses, which is good feedback for future courses. Also, some of the problem of mistranslation of conservation terminology could be avoided if Henderson could see the faces of the participants more clearly and intervene when she felt there were uncertainties in understanding.

In response to the question of the effectiveness and sustainability of in-person training, the response provided a nuanced perspective. It was acknowledged that in-person training is generally more effective due to the immediacy and direct interaction it provides, which are considered to be beneficial in terms of knowledge transfer. However, the methodology employed in this course was found to be more sustainable. The course was structured to include not only in-person sessions, but also homework and assignments that extended the learning process over time. This blended approach allowed participants to engage with the material on an ongoing basis, rather than trying to absorb everything in an intensive, short-term format. Henderson felt that this method yielded better results than trying to cram the entire training into a two-day session. While a two-day format may work for some, it doesn't lend itself well to developing practical skills that require more time and practice to master. It was also briefly discussed if it would be beneficial if Henderson could travel to Kairouan after giving her course. A follow-up may prove beneficial for future courses, as Henderson lacked a comprehensive understanding of the situation in the lab. The participants did not provide any video footage or a substantial number of images relating to the conservation situation in

the lab. It was noted that there were difficulties in verifying whether the participants had fully implemented the knowledge they had gained. While the use of videos could have provided further insights into the participants progress, it was acknowledged that they might not always be forthcoming about their actual level of understanding or application. The desire to present themselves in the best light might lead to some discrepancies between reported and actual progress. Cultural differences in pedagogical approaches between industrial and emerging countries were also addressed. Henderson suggested to offer an introductory session on pedagogy at the beginning of the course to explain the learning methods and manage participants expectations. This would help bridge the gap between traditional teaching expectations and the interactive learning experience provided.

The final phase of the course, which was more flexibly structured, was particularly well-received from Henderson and the participants as it allowed room for feedback and adjustments, leading to significant progress among participants.

Further reflective insights were provided by Amy Crossman in her evaluation interview. Crossman recounted several challenges and opportunities in the Tunisian context and specifically in the lab. One major obstacle was the lack of prior data on local pest species, pest management practices, and the local pest management law – information that would help tailoring an effective IPM programme. Efforts to gather such data, including requesting pre-course information on local practices and resources, were only partially successful. She was also unable to access the collection during the training, which would have been helpful. This shows the importance of preparatory research and the value of post-training follow-up to assess implementation and refine the course. Crossman also noted specific cultural and organisational challenges: formal feedback and testing were not culturally favoured in Middle Eastern/Arab countries, necessitating reliance on informal feedback through group discussion, observation, and practical exercises. She observed a prevalent “fear of failure” – a reluctance to commit to answers in group settings, surveys, or, in the case of IPM, the fear that something would go wrong during implementation, despite this being a normal process. This could be addressed by normalising continuous improvement and integrating senior management into the conversation. She experienced this in her work in many Middle Eastern and Arab countries, especially in IPM courses, which are risk-based processes. Language and cultural adaptation were further highlighted as essential: Crossman built time into the schedule for Friday prayers but also for informal discussions, used image resources to support comprehension, and developed Arabic-language handouts. She would really like to translate

more of her resources into Arabic for future courses. She emphasised the engaged discussions in the group - often more lively than in comparable UK settings - and attributed this to the effectiveness of practical exercises and collaborative group work. One of her recommendations for future courses is a blended learning approaches, incorporating both in-person and remote, specialist support. And she recommended that instructors in similar contexts remain flexible and open-minded. Crossman strongly recommends finding out about local cultural conditions in advance (break times, opening/closing timing of the facility etc.), even if this can be difficult as clear answers are often hard to come by, even when you ask directly. Communication in the Middle East is often focused on saying what the questioner wants to hear rather than describing the practical realities. Regular follow-up and sustained engagement could be key to a long-term success of the IPM measurements, this can also be done online. While formal feedback was not customary, participants nevertheless conveyed informally that the IPM course was among the most valuable and engaging trainings they had received at NLPCPM.

As the interview with the interns took place between the two courses, it mainly reflects on their general experience of the internship and Henderson's course. Interviewing the interns about both their course-related and general internship experiences proved to be quite challenging. This difficulty may have been due to their fear of potentially disrespecting the head of the laboratory and the risk of losing their placement. However, this is speculative and will be explored further in the next chapter, which includes the authors personal reflections. By using focus group methodology and an interpreter, it was possible to conduct group interviews, which allowed the interns to express themselves more comfortably in Arabic. For obvious reasons I won't mention the intern's names.

The interns reported overwhelmingly positive and engaging experiences during their first year. They particularly valued the opportunity to work with authentic manuscripts, which further heightened their interest and curiosity in conservation. The unique nature of each manuscript gave a sense of pride in their work, whilst guidance from senior conservators and KMP staff helped build their confidence in decision-making. One intern, drawing comparisons with her previous internship experience in Italy, particularly appreciated the practical aspects of the laboratory work in Kairouan. For most interns, whose university education had been predominantly theoretical, this internship provided their first extensive hands-on experience, which they described as exceptional. Throughout the programme, they

developed significant skills in interventive conservation of paper and parchment, manuscript digitisation techniques, and theoretical understanding. Their practical knowledge application improved considerably, alongside a deepening appreciation for manuscript significance. Working in teams enhanced their organisational skills and prepared them for professional life, increasing their confidence and teaching them to handle manuscripts carefully, especially since they particularly enjoyed working with parchment.

When asked what they would have changed, the interns expressed a desire for better equipment and materials for the lab, as well as more professional support in the form of courses on ink corrosion, chemical solution application, parchment conservation and ink testing.

The interns acknowledged the significance of Jane Henderson's course content, though they noted several areas where the delivery could have been more tailored to their specific needs. Whilst the course materials were valuable, they found the discussions occasionally too general and overly focused on museum contexts, which created some confusion. They expressed a desire for more targeted discussions about laboratory practices and specific materials, particularly parchment, along with greater focus on Kairouan's unique climatic conditions. The absence of in-person instruction emerged as a significant limitation. The interns expressed that theoretical knowledge alone was insufficient, and that practical application was crucial to their learning process. They recognised the two-way nature of learning and suggested that Henderson's physical presence in Kairouan for part of the course would have enabled her to observe and understand their working methods directly. Nevertheless, the interns particularly valued the pre-recorded videos created by Henderson, appreciating them as a lasting resource they could revisit for future reference. This aspect of the course provided a valuable ongoing learning tool, despite the limitations of the remote delivery format.

5.2.5 Personal Reflection

As the author attended the course led by Jane Henderson in person, this is a reflection on the course itself. Several noteworthy observations emerged during the delivery of the course. The requirement for simultaneous translation presented an unexpected challenge and consumed more time than had been planned for. However, the WhatsApp group proved an effective communication tool, facilitating translations and enabling image sharing to enhance understanding. Henderson made deliberate efforts to encourage open dialogue from the beginning, using interactive icebreaker questions to stimulate participation. Her efforts on presenting change as an opportunity rather than a threat was particularly noteworthy.

Participant engagement sometimes proved challenging, likely due to language barriers. The generous allocation of time for group work and subsequent discussions was beneficial to the learning process. The course structure featured a well-conceived progression in exercise complexity. However, this increasing complexity appeared to challenge some participants, particularly senior conservators. Their early departures from some lectures suggested a degree of disengagement. When questioned, these senior staff members expressed a preference for practical rather than theoretical instruction, indicating that the significance of preventive conservation had not been effectively conveyed. This observation reflects not on the course quality but rather shows that transforming established conservation perspectives requires sustained effort over time, beyond what a single course can achieve. The educational materials demonstrated careful consideration in their design. The instructional videos were concise and well-structured, serving as effective learning tools, whilst the learning maps provided clear guidance. The assignments provided significant educational benefits, particularly evident in the intern's final presentations.

5.3 Conclusion

The research subjects from Germany and Tunisia demonstrate distinct approaches to conservation training, each influenced by its specific cultural and educational context. CICS in Germany has successfully integrated digital teaching methods through the “Jigsaw Teaching in Conservation-Restoration” project. Students, particularly familiar with digital platforms, have embraced the flipped classroom model, which maximises time for practical work. However, some students seem to find this concept difficult and see it as extra work. This shows that there is still a lot of persuading to be done by lecturers. Discussions with lecturers in addition to tutorials seem to be seen as particularly helpful. However, the production of video tutorials requires considerable resources and is time consuming, although it may save time in the long run.

In contrast, the KMP in Tunisia illustrates the complexities of establishing conservation training in an emerging country. Unlike Germany, where conservation training has been university-based since the 1980s, Tunisian paper conservation training occurs not within universities but directly in workshops through knowledge transfer from senior conservators or via short workshops delivered by experts from Tunisia and abroad. Despite challenges such as language barriers and limited access to materials, the project has successfully implemented blended learning approaches, as demonstrated by Jane Henderson's course or hands-on

training on IPM by Amy Crossman. The experience shows that effective training must be adapted to local conditions and cultural contexts. Personal contact proves crucial in building trust and ensuring knowledge transfer, suggesting that future blended learning should incorporate in-person visits from course leaders. The interns appreciated the pre-recorded videos in Hendersons course as resources they could revisit; however, they noted that the absence of in-person instruction was a limitation, saying that theoretical knowledge alone was insufficient for their training needs. A circumstance that did not take place in the shorter in-person training by Crossman. In both cases a follow-up didn't happen yet but seems necessary of a sustainable training.

The experience showed that whilst translation was necessary, important nuances could be lost, suggesting that skilled translators with knowledge of conservation terminology are essential. The Tunisian context also revealed how limited access to conservation materials and equipment shapes training approaches, requiring adaptations that take into account the availability of local resources.

When examining the research question „How can teaching methodologies in paper conservation be culturally adapted to ensure effective knowledge transfer between Western and non-Western educational contexts?“, the experiences at the CICS in Germany and the KMP in Tunisia showed valuable insights. Both research subjects reveal that whilst digital teaching methods offer valuable opportunities, their implementation must be carefully tailored to specific environments. Success depends on understanding local needs, providing sustained support, and balancing digital innovation with traditional hands-on training approaches. The contrast between the two programmes - CICS as an established conservation programme at a university in an industrialised country and NLPCPM as a developing programme in an emerging country - reinforces the importance of socio-economic factors in developing sustainable conservation training. The historical context of conservation training in Tunisia, including the influence of French colonisation and earlier German-Tunisian collaborations in the 1980s-90s, continues to shape approaches to cultural heritage conservation in Tunisia and still requires efforts to decolonise conservation discourse and training.

6 Cultural Identity

As demonstrated by the research subject of the KMP, comprehending the local requirements and adapting workshops to local contexts is crucial when it comes to teaching in an environment outside one's own. The acknowledgement of this fact leads to the concept of cultural identity in the context of conservation and specifically conservation training.

This chapter explores the dynamic relationship between cultural heritage preservation and cultural identity, with particular focus on cultural sensitivity and intercultural communication in conservation education.

6.1 Cultural Sensitivity

Cultural sensitivity, or cultural awareness, is a term conservators must deal with in their work. According to Eide and Allen (2005) cultural sensitivity is referred as the ability to be aware of, understand, and respect the differences in cultural backgrounds, practices, and behaviours of people from different cultures. It involves being mindful of one's own cultural biases and being open to learning about and appreciating the values, beliefs, and norms of other cultures. Knowledge, attention, understanding, respect and optimisation of interventions based on cultural needs are the main characteristics of cultural sensitivity (Foronda, 2008).

It can be argued that relationships are of greater importance than the task itself. In her book, *Performing Qualitative Cross-Cultural Research*, Liamputtong (2010) provides an overview with numerous case studies that illustrate the need for responsible researchers to act in a certain manner. This can also be applied to teachers or conservators. She argues that researchers must possess an understanding of the culture in which they operate, a process that needs a willingness to learn, sufficient time, and flexibility (Liamputtong, 2010, p. 107).

The globalisation of conservation practices and international heritage projects has introduced significant cultural diversity to the profession: through the treatment of artefacts from varied cultural origins, through cross-cultural educational exchanges and through diverse backgrounds from conservators. However, these cultural differences can present challenges in conservation methodology and training programmes. Conservation professionals must demonstrate cultural competence by recognising and respecting the distinct cultural values and traditions associated with the artefacts under their care, whilst acknowledging shared conservation principles across cultures. From a conservator's point of view, cultural sensitivity involves awareness and respect for the cultural meanings and values associated

with the objects to be conserved. This may mean that conservators select specific conservation techniques or materials that respect the cultural context of the object or that they work closely with the community to ensure that the conservation work aligns with cultural expectations. However, living up to that “code” can sometimes be challenging.

The theoretical understanding of cultural sensitivity in conservation must be complemented by examining real-world applications and challenges. The following examples from various cultural contexts and conservation projects illustrate how cultural sensitivity manifests in practice and demonstrate its crucial importance in both conservation work and education. In Chao-Ching Fu’s (2005) article, he argues that Eastern Asian and Western countries have different attitudes towards intangible values embedded in monuments and sites. Western countries value the preservation of the historical fabric and appearance of monuments. This approach is grounded in the desire to authentically represent the human past and with that the intangible values through the conservation of cultural heritage. Eastern Asian countries, on the other hand, have often prioritised the completeness and renewal of cultural sites, sometimes at the expense of authenticity. This is due to a cultural sensitivity that values the visual and psychological integrity of the heritage, often seeking to restore monuments to their perceived original state, even without solid historical evidence. Since Eastern Asian countries become more involved in international conservation affairs, they are also developing a greater appreciation for intangible values. These slow changes will without a doubt also influence the next generations of conservators in approaching conservation projects.

Another article deals with the question of diversity and the underrepresentation of Black and ethnic minorities in the UK heritage sector (Francis, 2021). The author, herself identifying as a woman of mixed black and white ethnicity, shares her personal experiences into the systemic barriers that prevent a more inclusive and diverse professional landscape. In the UK (and in Germany as well) the conservation profession is predominantly white, middle to upper-class and female. She pointed out that the professions homogeneity contrasts sharply with the multicultural nature of the heritage it seeks to preserve. She also outlines the educational disadvantages minorities could face, be it educational attainment gap or financial problems. Conservation is an elite study programme. The article also touches on the concept of cultural sensitivity in conservation. Francis stresses the importance of recognising and addressing the complex histories embedded in cultural artefacts, particularly those related to colonialism and slavery. She recounts her own experience of working on artworks that may

have been funded by the exploitation of enslaved people and questions the ethical implications of conserving such objects without acknowledging their controversial histories. The experiences Francis has had in the UK certainly also apply to other European countries. Diversifying the conservation field and the education system would be beneficial for the conservation world itself by gaining more cultural awareness. A similar article comes from Wickens and Gupta (2022) from the US where they also reflect on the homogeneity in the conservation field, which is also like the example before, dominated by white educated middle-class females. During the pandemic, they organised an online workshop to try to transform the culture of exclusion into one of inclusion; they developed an understanding of White Supremacy Culture and recognised that to achieve inclusion, the mechanisms of exclusion must be understood and deconstructed. They argue that a sensitive and respectful recognition of diverse backgrounds and perspectives is essential to create a truly inclusive work environment. Cultural sensitivity means being aware of one's own privileges and positions of power and using them to open spaces for others. The authors illustrate this through the experience of their workshop, where they initiated learning processes based on mutual respect and the inclusion of voices that have traditionally been marginalised. They demonstrate that acknowledging cultural diversity and becoming sensitive to the life realities of others is a crucial step in overcoming the barriers of exclusion and establishing a culture where everyone feels welcome and equally valued.

In Hendersons (2020) insightful article she urges the conservation community to reconsider its traditional approach to preserving cultural heritage. She critiques the prevailing notion that the primary goal of conservation is to extend the lifespan of objects, often at the expense of the living cultures and communities that these objects represent. Henderson points out that this approach not only risks excluding diverse groups from engaging with their cultural heritage but also fails to recognise the dynamic and evolving nature of cultural significance. At the heart of Hendersons argument is the call for cultural sensitivity in conservation practice. She suggests that conservators must be attuned to the multiple meanings and values that cultural artefacts hold for different communities. This sensitivity involves understanding that the significance of an object is not fixed but is instead shaped by the context in which it is viewed and the communities it connects to. An example she presents is the case of a Banksy artwork in Port Talbot, Wales. The decision to remove the artwork from its original location to a gallery, driven by preservation concerns, resulted in the loss of a powerful cultural statement that resonated with the local community. This case underscores the tension between

preserving objects for an abstract future and ensuring access to cultural expressions for contemporary communities.

A more practical example from the Cologne Institute of Conservation Sciences (CICS) involves the conservation of Jaina miniatures from the Rautenstrauch-Joest Museum in Cologne. These miniatures, dating from approximately 1375 to 1620 CE, required conservation treatment due to losses caused by corroded copper green pigment. Additionally, some of the miniatures had been poorly repaired with self-adhesive tape.

For the exhibition “Heilige und Asketen - Miniaturmalerei der Jaina aus Indien”, a selection of these miniatures was to be displayed (Krüger, 2020). A BA thesis focused on the conservation of these Jaina miniatures, noting the importance of cultural sensitivity in the process. In Jain culture, all life is considered sacred (Szűcs *et al.*, 2012), which meant that traditional animal glue for conservation, such as isinglass, could not be used out of respect for the cultural values associated with these objects. Instead, Hydroxypropylcellulose was used for the insertion of inlays and the mending of tears, ensuring the conservation methods were aligned with the cultural and ethical considerations of the Jain community (Wittich, 2020).

A successful collaboration between conservators and Native Alaskan weavers in Juneau and Sitka are shown in an article by Criswell *et al.* (2008). In this collaboration the goal was to move beyond cultural sensitivity towards cultural centeredness by enriching ethnographic conservation of Alaskan spruce root baskets. The native weaver's basketry is an integral part of their identity. Two museums which are in possession of baskets and two local weavers work together, the weavers were offered an internship to conserve several baskets. This collaborative effort was not just about preserving physical artefacts but also about understanding and respecting the cultural significance of these baskets. The weavers shared their deep connection with the baskets, viewing them as cultural teachers who carry history and traditions. The two museum conservators gained invaluable insights from the weavers, learning about the materials, processing, and weaving techniques. They discovered that the knowledge passed down through generations was not just about the physical act of weaving but also about the spiritual and environmental connections. The collaboration extended beyond the museum walls, as the conservators joined the weavers in the forest to gather spruce roots, experiencing firsthand the materials natural source. They participated in the roasting and preparation of the roots, engaging in discussions about the reasons behind these processes. The hands-on experience was crucial in developing a profound understanding and appreciation for the work of the ancient weavers. The project's success lies in the mutual learning and respect between the weavers and conservators. The conservators applied

conservation treatments to the baskets, using techniques that respected the wishes of the weavers and the cultural significance of the objects. The weavers, in turn, offered insights into the “lives” of the baskets, ensuring that the treatments were not only about repair but also about maintaining the baskets connection to their cultural heritage.

As the multiple examples have shown, integrating cultural sensitivity into conservation practice and education is essential for developing a truly inclusive and effective profession. However, the profession still has a long way to go, and achieving cultural sensitivity can only happen by diversifying the field. Teachers should educate students about cultural sensitivity through several effective methods. These include modules on cultural contexts, practice-oriented projects that involve collaboration with diverse communities or foster the examination of the cultural history, and intercultural workshops and seminars that focus on communication and cultural values. Additionally, inviting guest lecturers from various cultural backgrounds and organising field trips to international conservation projects can provide valuable insights. On the other hand, as the next chapter shows, conservators who train in cultural environments other than their own should also be aware of different intercultural communications and how to deal with them.

6.2 Intercultural Communication

Globalisation, particularly since the internet’s emergence, has made intercultural communication increasingly important. Before the 1990s, European perspectives dominated the field of architectural conservation, as demonstrated by the Venice Charter, reflecting a distinctly Eurocentric approach (Falser and Lipp, 2010, p. 12).

Meaningful intercultural dialogue and discussions about authenticity in conservation only became possible after the end of colonialism and a subsequent period of reflection (Tomaszewski, 2002). For example Winters research (2014) challenges the common belief that Asian and Western approaches to heritage conservation are fundamentally different. He suggests that these perceived differences are often due to post-colonial identity formation, the desire for international recognition and practical conservation challenges, rather than genuine cultural differences. That is something the Burra Charter from 1979 (ICOMOS, 2013) or the Nara Document of Authenticity from 1994 are trying to address. The last one states: “*All cultures and societies are rooted in the particular forms and means of tangible and intangible expression which constitute their heritage, and these should be respected.*” (Lemaire and

Stovel, 1994). Notably, conservation principles need not be universally accepted. Apart from the assessment of physical evidence and documentation of historical fabric, these principles are not based on scientific facts but rather on cultural interpretations (Falser and Lipp, 2010, p. 13).

In today's increasingly interconnected world, particularly within the cultural heritage sector, intercultural communication has become an essential skill for professional success. This communication competence encompasses the ability to understand, respect, and effectively address cultural differences when interacting with others (Thu, 2024) or in other words Intercultural communication refers to the exchange of information (both verbal and non-verbal) between individuals from different cultural backgrounds (Martin and Nakayama, 2022). Whilst language differences often present the most obvious challenge – potentially leading to misunderstandings in research or teaching contexts (Irvine, Roberts and Bradbury-Jones, 2008) – intercultural communication extends far beyond mere linguistic considerations. Indeed, researchers frequently need to collaborate with interpreters or translators to bridge these language gaps (see chapter 1.2). At its foundation, intercultural communication rests upon two fundamental pillars: communication and culture. Communication encompasses all methods of exchanging information, whilst culture comprises the values, beliefs, norms, and practices unique to specific groups of people. The research of scholars such as Edward T. Hall (1989) established the foundation for the understanding of intercultural communication by initially focusing on national differences. Hall employed the metaphor of an iceberg to illustrate how culture manifests itself: visible elements such as clothing, language, and food represent merely the tip of the iceberg floating above the water, whilst the more profound aspects – values, beliefs, norms, and traditions – remain hidden beneath the surface, yet fundamentally shape all cultural interactions (see Fig. 55).

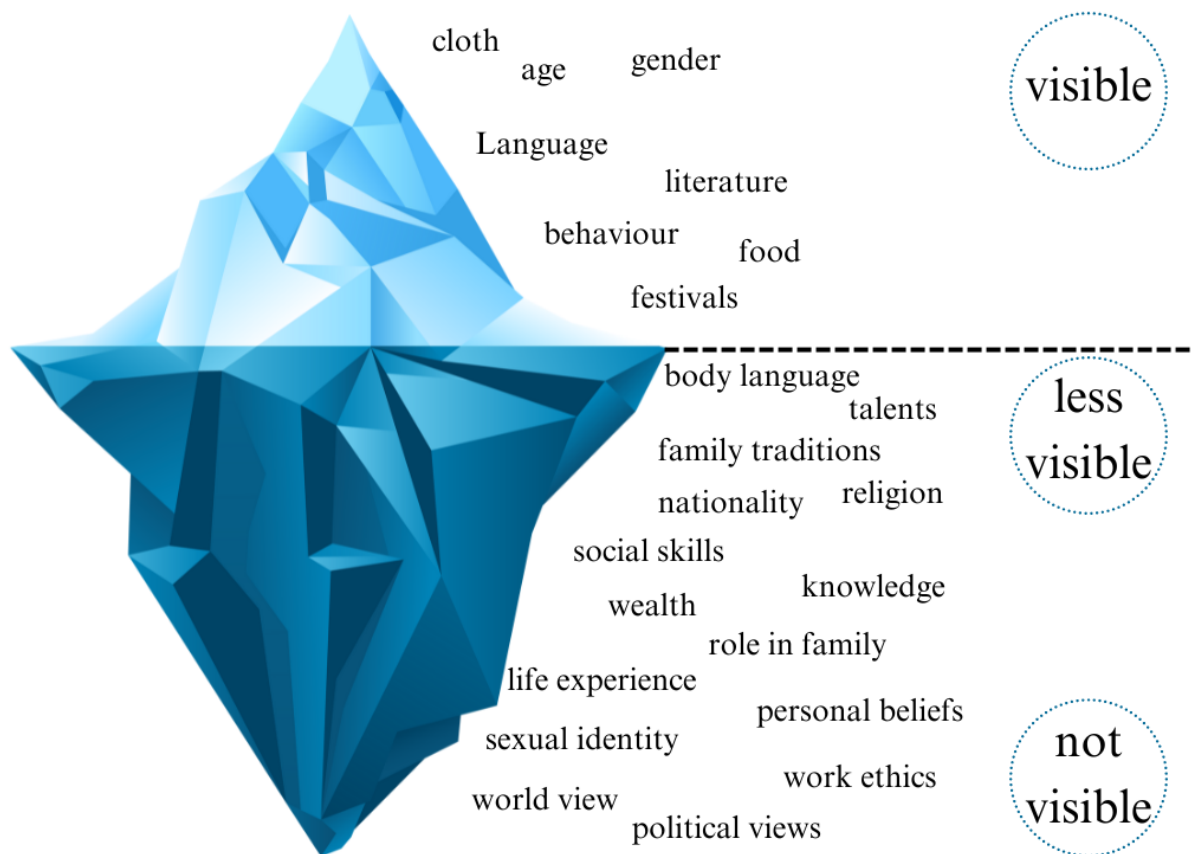


Figure 55 iceberg model after Edward Hall (1989), the terms are only examples and do not claim to be complete. The terms are arranged in a hierarchical structure, with the most visible terms appearing at the top and the least visible terms at the bottom, in relation to the culture of groups of people. © Marlen Börngen

The contemporary understanding of intercultural communication has evolved significantly, extending well beyond simple national or cultural boundaries. The concept now encompasses many differences, including ethnicity, religion, gender, and socio-economic status, amongst others (Neuliep, 2021). These various cultural elements significantly shape how societies and individual's approach and study intercultural communication. It is essential to acknowledge the influence of both direct and indirect communication styles and to recognise the significance of non-verbal communication, including gestures, facial expressions, and posture.

6.2.1 Cultural Map

The increasing globalisation of the workforce, also evident in the cultural heritage conservation sector, has created valuable opportunities through multicultural collaboration. This diversity, especially prominent in international research projects and workshops, enhances innovation potential by bringing together varied cultural perspectives and

approaches. While businesses benefit from engaging international talent in creative teams early in their development, this cultural diversity presents both opportunities and challenges. Cultural differences significantly influence workplace dynamics, affecting communication styles, decision-making processes, and the development of trust among team members. The effectiveness of multicultural collaboration depends not so much on the absolute differences between cultures, but rather on how these differences are understood and managed.

Hofstede's (2013) cultural dimensions framework provides valuable insights into how cultural factors influence organisational behaviour and innovation potential, though the precise nature of this influence remains somewhat unclear. Culture can be understood as a shared framework through which individuals from similar backgrounds interpret situations in comparable ways. For successful collaboration in multicultural environments, organisations must develop a nuanced understanding of cultural differences and implement careful management strategies (Erez and Earley, 1993). This is also particularly crucial in the heritage sector, where international cooperation and knowledge exchange are increasingly becoming the norm rather than the exception.

Despite the existence of several models of cultural dimensions (Hofstede, 2013; Hofstede *et al.*, 2010; Trompenaars and Hampden-Turner, 2020), Meyer's (2024) "The Culture Map" provides the most practical advice on managing international teams. Her work is especially valuable for its incorporation of real-world examples that illustrate the challenges and dynamics within intercultural teams. The framework's eight dimensional scales offer a systematic approach to understanding and comparing different national working cultures. This analytical tool could prove particularly beneficial when applied to the conservation field, where international collaboration is increasingly common. By placing countries in relation to each other along these dimensions, Meyer's model provides a practical framework for understanding and anticipating potential cultural differences in professional interactions.

The first scale is *Communication*, with its extremes of high or low context, developed through the research of Edward Hall (1989). Low context cultures communicate clearly and explicitly. High-context cultures communicate subtly and often implicitly, leaving much to be inferred and read between the lines (Meyer, 2024, p. 44).

The *Evaluating* scale measures cultural preferences for frank versus diplomatic negative feedback or like in Meyer book called direct negative feedback on the one side and indirect negative feedback on the other side (Meyer, 2024, p. 79), underlining how "constructive" criticism can have very different meanings. This is often confused with the Communicating

scale, but countries go to both ends on both – for example, the French are high-context communicators, yet more direct in criticism than Americans; Spanish and Mexicans are similar on context, but very different on frankness.

The third scale is *Persuading* with they're both ends, concept first or application first.

Cultural, philosophical, religious and educational backgrounds seem to be rooted in methods of persuasion and convincing arguments. Typically, Western leaders would present specific thinking by breaking down arguments into individual parts, whereas Asian leaders use holistic thinking to show how the parts fit together.

The *Leading* scale examines how different cultures perceive and respond to authority in the workplace. Based on Hofstede's power distance concept (Ly, 2013), this scale positions cultures along a spectrum from egalitarian to hierarchical approaches to leadership (Meyer, 2024, p. 124). At the egalitarian end of the spectrum, organisations typically feature flat hierarchical structures where the relationship between managers and their team members is relatively informal. The professional distance between leadership and staff is minimal, fostering open dialogue and collaborative decision-making. At the hierarchical end, organisations maintain more traditional power structures, where leaders exercise authority from clearly defined superior positions. In these cultures, there is a marked separation between management and staff, with formal relationships and clear chains of command.

The *Deciding* scale measures how different cultures approach decision-making processes, ranging from consensual (group-based) to top-down (authority-based) approaches (Meyer, 2024, p. 163). Interestingly, whilst one might expect hierarchical cultures to consistently favour top-down decision-making, the reality is more nuanced. This scale reveals some surprising contrasts, for example German organisations, despite having more hierarchical structures than American ones, typically prioritise building group consensus before making decisions while Japanese business culture presents a particularly intriguing case, combining strong hierarchical structures with an equally strong emphasis on consensus-building in decision-making. These examples challenge the common assumption that hierarchical cultures automatically adopt less democratic decision-making processes. Instead, they demonstrate that organisational hierarchy and decision-making approaches can operate independently of each other, creating unique cultural combinations in different countries.

The *Trusting* scale examines how different cultures build and maintain professional trust (Meyer, 2024, p. 183). Drawing from Trompenaars and Hampden-Turner's (2020) concept of Achievement versus Ascription, this scale identifies two distinct approaches to establishing trust. In task-based cultures, trust develops primarily through professional interactions. People

earn trust by demonstrating competence in their work, reliability in meeting commitments, and successful collaboration on projects. The focus remains on professional capabilities and proven track records rather than personal connections. In contrast, relationship-based cultures build trust through personal connections. Trust forms through developing personal relationships, establishing mutual understanding, and creating social bonds outside of work. In these cultures, professional relationships often begin with personal connection-building before moving on to business matters.

The *Disagreeing* scale explores how different cultures handle conflict and opposition within professional settings (Meyer, 2024, p. 213). This scale, which shares some commonalities with Hofstede's (2013) masculinity dimension, ranges from confrontational to confrontation-avoiding approaches. In confrontational cultures, open disagreement is viewed as a natural and often productive part of professional interaction. These cultures typically see direct challenges and debates as valuable tools for improving ideas and reaching better outcomes. Team members feel comfortable expressing opposing views openly, and such behaviour is often interpreted as engagement and commitment to excellence. On the opposite end, confrontation-avoiding cultures perceive open disagreement as potentially harmful to team harmony and working relationships. In these cultures, disagreements are typically expressed more subtly and indirectly, with great care taken to preserve harmony and avoid public opposition. Feedback and alternative viewpoints are often communicated through more diplomatic and private channels.

The *Scheduling* scale, the final dimension in Meyer's framework, examines how different cultures see and manage time. Drawing from Edward Hall's (1989) concept of time orientation, this scale contrasts two fundamental approaches to time management in professional settings. Linear-Time cultures, also known as monochronic, operate with a structured and sequential approach to time. In these cultures, schedules are viewed as firm commitments, deadlines are strictly observed, and activities are typically planned and executed in a systematic, linear fashion. Punctuality is highly valued, and deviations from planned schedules are often viewed as unprofessional or disrespectful. In contrast, Flexible-Time or polychronic cultures adopt a more fluid and adaptable approach to time management. These cultures tend to view schedules as general guidelines rather than rigid commitments, allowing for multiple activities to occur simultaneously and adapting plans based on emerging circumstances. Relationships and completing tasks properly often take precedence over strict adherence to schedules.

One example are Germany's eight scales on the Culture Map (see Fig. 56). The Map was created with the Country Mapping Tool⁵⁰ from Meyer. In the context of Germany, these scales provide some interesting insights into German business culture.

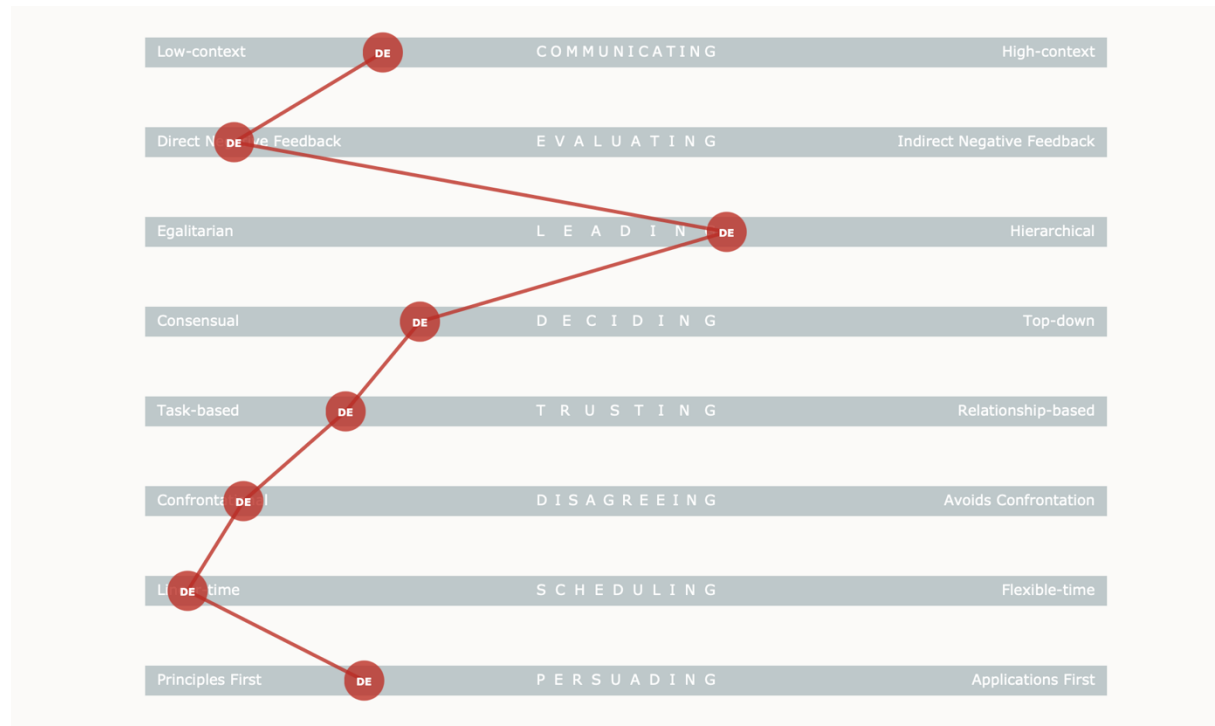


Figure 56 Country Mapping 2022 of Germany. © Erin Meyer

Germany falls into the category of a low-context culture on the communications scale. It, therefore, means that communication in Germany is rather direct, clear, and explicit. The Germans value precise and unambiguous information, and that the messages passed should be straightforward. Misunderstandings are reduced by ensuring that the communication is explicit and to the point. The ratings show that Germany is a tell-it-like-it-is culture. On the Evaluation scale. Negative feedback is delivered straight, and to the point. This forthrightness can occasionally be misinterpreted as harsh in international contexts but is regarded as constructive and honest within Germany. The leading dimension includes Germany somewhere between egalitarian and hierarchical. Although there is some hierarchy, there is a focus on consensus and teamwork. Leaders in Germany tend to be inclusive of their teams in decision-making processes rather than making any unilateral decisions. Germany is strongly consensus-orientated as the deciding scale shows. Decisions are often reached through

⁵⁰ The tool is based on Erin Meyers Book “The Culture Map”. It allows you to choose the countries you are interested in and compare the with different countries. <https://erinmeyer.com/tools/culture-map-premium/> (accesses 10.08.2023).

intensive discussion and group voting. This is contrary to other hierarchical cultures where the boss alone makes the decisions. In Germany, the team's opinion is highly valued and part of the decision-making process. On the scale of trust, Germany can be classed as a task-based culture. This means that trust is given where professional competence exists, reliability, and the quality of work being done. Personal relationships play less of a central role in building trust. The German culture is one of being confrontational on the disagreeing scale, it is tolerating, and even open to disagreement – open disagreement is regarded as healthy. This tolerance for open discussion and debate will ensure that the decisions are informed and well thought out. Structured and time-bound planning is very important to Germans. This can be seen by the size of planning dimension. Punctuality plays a central role, and one is not supposed to miss appointments and deadlines. And lastly, on the scale of persuading, Germans like to be convinced with principles. Arguments are mostly built deductively – this means that the reasoning flows from the general to the particular. To Germans, this approach is considered logical and structured.

Let's extend this analysis by comparing Germany with Tunisia (Fig. 57), which presents some contrasts on Meyer's Cultural Map.

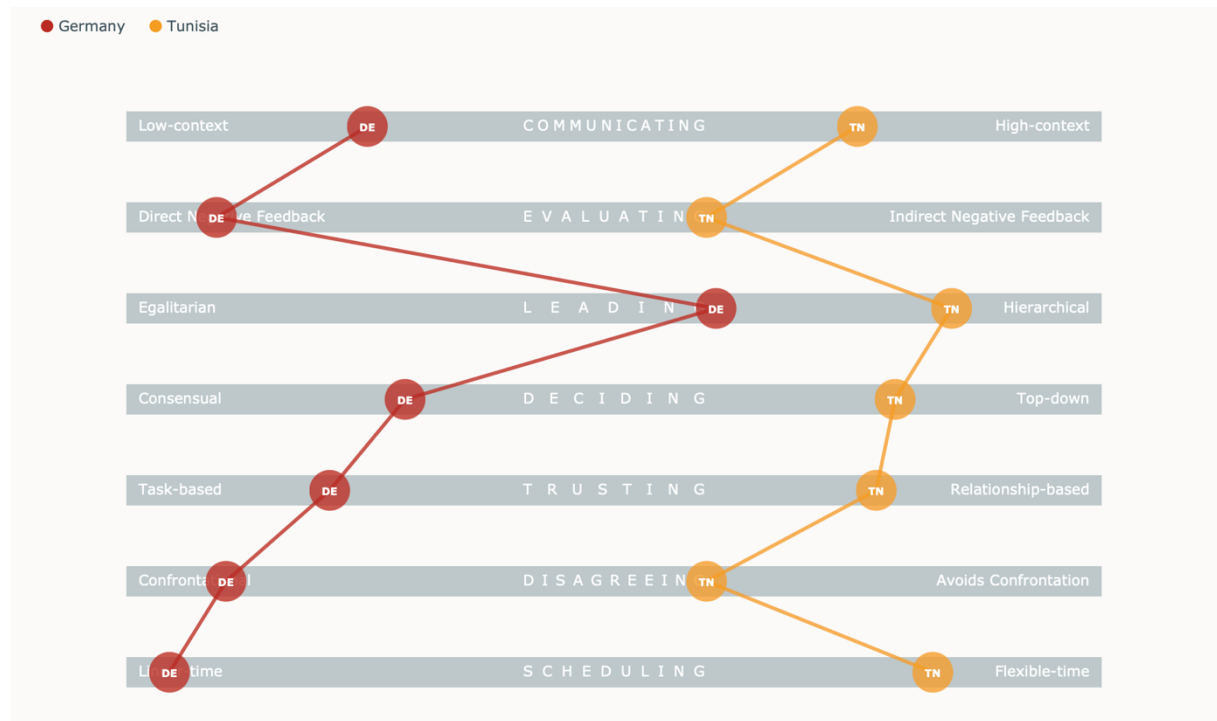


Figure 57 Country Mapping 2022 of Germany (red) and Tunisia (yellow). © Erin Meyer

Tunisia, in contrast to Germany's low-context communication style, sits firmly on the high-context end of the communication scale. This means that Tunisians often communicate in ways where context, subtle cues, and implicit understanding play crucial roles. Messages are often layered with meaning that goes beyond the literal words spoken.

On the evaluating scale, while Germany is known for direct negative feedback, Tunisia takes a different approach, preferring more indirect negative feedback. This cultural trait means that criticism is often wrapped in diplomatic language and delivered with careful attention to preserving relationships and saving face (Grainger, Mills and Sibanda, 2010).

The leadership dimension shows another contrast. While Germany maintains a relatively balanced position between egalitarian and hierarchical structures, Tunisia leans strongly toward hierarchical organisation. This means that Tunisian business culture typically operates with more clearly defined power distances and respect for authority.

In decision-making processes, the differences are equally notable. Germany's consensual approach contrasts with Tunisia's top-down decision-making style. Where German teams might engage in lengthy group discussions to reach consensus, Tunisians often rely on authority figures to make final decisions.

Trust-building in Tunisia is relationship-based, unlike Germany's task-based approach. This means that Tunisians typically invest time in building personal relationships before engaging in serious business matters, whereas Germans tend to build trust through professional competence and reliable performance.

The disagreeing scale reveals another contrast. While Germany's culture embraces confrontation and direct disagreement, Tunisia's business culture tends to avoid confrontation, preferring to maintain harmony and resolve conflicts through indirect means.

Finally, in terms of scheduling, Tunisia demonstrates a more flexible approach to time management, contrasting sharply with Germany's linear-time orientation. This means that Tunisians might be more adaptable to changing circumstances and less rigid about strict scheduling than their German counterparts.

These cultural differences between Germany and Tunisia may also influence teaching approaches in these countries (see chapter 5.3). Understanding and respecting these differences can be the key to successful intercultural courses.

As always with such models, there are also some critiques. A central point of criticism is the simplification and generalisation of cultures, which are complex and dynamic and difficult to fully capture in scales. For example, the author of this dissertation, as a German, can only

partially understand the Trust scale and Germans as a task-based nation. In many areas of work or science, personal relationships play a central role in building trust. The distant nuances within cultures are not captured in this way. Regional, social or economic differences within a country can be overlooked. Another aspect that should be viewed critically is the danger of stereotyping. When looking at this model, people could jump to conclusions based on general cultural characteristics. For example, Germans are always considered to be very punctual, which is certainly true for many, but there are also plenty of counterexamples. This can lead to inaccurate and unfair assumptions, as the individual differences in a culture are not sufficiently considered. The scales should also be strongly contextualised. What applies in one professional environment may not be so easily transferable to another. Specific conditions should therefore always be considered. The methodology and data on which Meyer's cultural map is based are also questioned. Meyer's analyses are based on Hofstede's principles and research and her own experiences from her professional life and numerous interviews. Questions of representativeness remain unanswered.

Finally, Meyer's model is criticised for viewing cultures as static, even though they change over time. Globalisation and cultural change are dynamic processes that a model like Meyer's may not be able to fully represent. Overall, Meyer's Culture Map is a useful tool to understand intercultural differences and to help discover possible new approaches. However, it is important to keep these criticisms in mind to gain a more realistic and nuanced view of intercultural interactions.

6.2.2 Intercultural communication in practice

The relationship between intercultural communication and cultural heritage is fundamentally interconnected. Cultural heritage forms the cornerstone of individual and community identity, whilst effective intercultural communication serves as a bridge between different cultures, helping resolve misunderstandings and conflicts. This connection is particularly relevant for conservators, who frequently work with artefacts from diverse cultural contexts or conduct workshops in various cultural settings.

The following examples illustrate the diverse ways in which cultural communication is integrated into the work practices of conservators across the globe.

As Antomarchi and Little (1993) wrote, ICCROM has organised several international conservation trainings since its foundation 1964 (ICCROM Website, accessed 11.08.2024).

The workshops have been characterised by diverse groups of participants with different

cultural, religious and educational backgrounds, which presents challenges but also enrichments in the learning experience. During this intercultural workshops ICCROM learned that personal security needs like housing, food, health and providing orientations to the local environment are essential to any effective learning. They have also recognised the importance of language in their workshops and have experimented with various approaches to ensure effective communications. ICCROM always wanted to offer bilingual training in English and French. They used simultaneous interpretations as well as consecutive interpretation⁵¹, giving preference for the later one to facilitate better interaction and understanding. However, due to financial reasons the bilingual approach is no longer widely in use. ICCROM has tailored teaching methods and materials to be inclusive of different cultural contexts, which includes the development of visual aids that can also replace the oral or written teaching. They also experimented with different approaches including bilingual workshops without translation, however language is still the main issue in international programmes because not everyone can speak English or French. Additionally, they have encouraged participant contributions and peer learning, allowing the course content to be enriched by the collective knowledge and experiences of the group. The organisation has also reflected on the broader implications of multiculturalism in conservation training. They have questioned the traditional Western approach to education, which often emphasises the accumulation of data, and have proposed a shift towards developing participants abilities to manage information and adopt a responsible attitude towards conservation challenges. Furthermore, ICCROM offers regular courses on communication and teaching skills in conservation and science (ICCROM Website, accessed 11.08.2024).

A few years later the same authors (Antomarchi *et al.*, 1996) wrote another article about a project called PREMA (Prevention in Museums in Africa) which is an analysis of the training strategies in the Sub-Saharan Africa by answering problems of only short-term experiences after completing conservation courses. PREMA, launched a decade ago, has evolved into a successful long-term initiative that has transformed the prospects of autonomous training and heritage preservation in Africa. The authors critically examine the concept of successful training, arguing that mere participant satisfaction or immediate positive feedback from lecturers is insufficient to gauge the true impact of training initiatives. They argue that for training to have a lasting regional or institutional effect, it must be part of a broader, visionary strategy that extends beyond the confines of individual courses or short-term experiences. The PREMA strategy was designed to be multifaceted, incorporating various activities such as

⁵¹ The „Interpreter“ is a conservator who is also participating in the workshop.

international university courses, national courses, regional seminars for directors, staff development activities, and technical assistance always with the goal of a: “[...] *long-term, low-tech and high-sensitivity* [...]” (Antomarchi *et al.*, 1996, p. 117) training methodology. These initiatives were aimed at creating a network of African professionals capable of assuming responsibility for conservation and ensuring the preservation of museum collections in sub-Saharan Africa. The programme has also addressed the challenges faced by trainees upon returning to their institutions, such as envy, isolation, and lack of professional recognition, by integrating communications training and providing technical assistance for on-site conservation projects.

Scott (2014) discusses in her paper that conservation is inherently interdisciplinary drawing from and contributing to a range of fields including humanities, sciences, and social sciences. Scott adapts Max-Neef’s (2005) model of transdisciplinarity⁵² to demonstrate how conservation can be seen as a transdisciplinary action that spans all four levels of his schema: from the empirical to the value-based. This positioning highlights conservation’s role in addressing complex, “wicked problems” that require interdisciplinary collaboration. In terms of intercultural communication, the paper notes that conservation, as a values-based interdiscipline, must navigate the diverse cultural contexts in which it operates. This involves understanding and respecting the varied values and perspectives that different communities hold regarding their cultural heritage. Effective intercultural communication is crucial for conservators to work successfully with communities and stakeholders from diverse backgrounds.

A more general approach is taken in the article by Kokko and Kyritsi (2012). The authors discuss the contemporary relevance of the cultural heritage of arts and crafts in European societies, arguing that there is an urgent need to preserve and develop traditional knowledge and techniques. The role of cultural heritage as a facilitator of intercultural communication and social cohesion is highlighted. It argues that traditional knowledge and techniques related to arts and crafts are vital components of cultural heritage that can bridge gaps between different cultures and generations. By conserving and developing these traditions, individuals can gain a deeper understanding and appreciation for the diverse cultural expressions that

⁵² Manfred Max-Neef’s (2005) conceptual model of transdisciplinarity is based on the idea that complex problems cannot be solved by disciplinary approaches alone. Instead, it requires the integration of knowledge and methods from different disciplines and the inclusion of non-academic knowledge. Conservators cover all four levels in this model: empirical level, pragmatic level, normative level and value level. This defines a transdisciplinary action.

exist within Europe and beyond. UNESCO's efforts to preserve World Cultural Heritage and engage young people in heritage conservation are also noted.

The case studies presented in this chapter demonstrate the intrinsic relationship between intercultural communication, cultural heritage and its conservation. While it is not always explicitly stated, intercultural communication already plays a significant role in global conservation projects, whether consciously or unconsciously.

6.3 Conclusion

The chapter asked the question of what role cultural identity, with the subchapters cultural sensitivity and intercultural communication, play in conservation and how these can possibly be given greater consideration in the training of conservators. Cultural heritage is an essential carrier of cultural identities. It is therefore all the more important that conservators respect the cultural significance and values of artefacts in their work and involve communities where possible. To achieve this, conservators need not only material or art technology skills, but also intercultural skills, which include cultural sensitivity and intercultural communication. Be it the conservation of artefacts from outside one's own cultural area or working with people from a different cultural background. When conserving such objects, consideration should therefore always be given to integrating traditional techniques into modern practices to take cultural sensitivity into account.

Intercultural communication is a factor which is becoming increasingly important as conservators work in international teams. Effective communication and co-operation require an understanding and respect for the cultural backgrounds of all those involved. Although not the only aspect, language has a significant influence on intercultural communication. Especially when communicating conservation methods in a different cultural context and in a different language, misunderstandings can easily arise, partly due to the inconsistency of conservation terminology and its translation difficulties and partly due to the different conservation histories in different countries. Another problem is the accessibility of international specialised literature. Most of the literature is published in English, but in many regions, this is not the first language, so the exchange between colleagues from different cultural backgrounds is limited. In addition to language, building trust (Eide and Allen, 2005) is also very important in international workshops. Giving workshops in emerging countries

from an industrialised nation requires a great deal of trust on the part of the emerging countries towards the teacher. After all, they provide access to their cultural heritage and thus also to their cultural identity. This also requires a great deal of empathy on the part of the teacher in the face of possible reservations. It is even more complicated if the teacher comes from a nation with a history of colonisation or similar, trust may take longer to develop (Salmon, 2007).

Principles and strategies that are successfully applied in international business can also be transferred to the training of conservators worldwide, as the Culture Map shows. As in international business, conservators need to know global standards and practices but adapt them to local conditions and cultural contexts. After all, for example it does not help to have the best conservation material available in your own country and to be able to use it for conservation practice, but this is not available for an international workshop because the country may not produce the material, or the material should not be used for other ethical reasons. Conservators must therefore be flexible and adapt their methods and techniques to the specific cultural and material requirements of the objects and circumstances.

7 Research Conclusion

This dissertation has examined the complex landscape of conservation education through multiple lenses, with a particular focus on the transfer of knowledge at established education systems at universities in western nations and in educational contexts in emerging countries. These contexts are represented by the Cologne Institute of Conservation Sciences (CICS) and the Kairouan Manuscript Project (KMP). The research has resulted in several significant findings, which will be discussed in the following subchapters.

7.1 Discussion of the findings

The shift from traditional apprenticeships to formal academic programmes over the past two centuries in Europe and North America demonstrates the profession's maturation, while highlighting ongoing challenges in standardisation and professional recognition. Despite nearly 40 years of academic training for paper conservators in Germany, these challenges persist and are likely to continue. These evolving educational approaches are particularly evident when comparing established conservation programmes in Europe with emerging ones in developing countries like Tunisia.

At CICS, the contemporary conservation curriculum must achieve a delicate balance between theoretical knowledge and practical application, with some arguing that theoretical content is overemphasised. Conversely, at Tunisia's National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) which is supported by the KMP, practical training takes precedence over theoretical foundations in conservation, such as Cultural Heritage Management or preventive conservation. This demonstrates an imbalance between established and emerging conservation education systems, while established institutions like CICS may risk relying too heavily on theoretical knowledge at the expense of hands-on experience, emerging programmes such as the NLPCPM might benefit from a stronger theoretical foundation to ensure long-term sustainability and professional development of their conservators. Finding the right balance between practical skills and theoretical understanding remains crucial for both established and emerging conservation training programmes. To address these educational imbalances and develop more effective training approaches for both cases, it is valuable to examine how different learning theories can be applied in conservation education.

Educational theories, particularly those focused on learning processes, provide valuable frameworks for addressing conservation training challenges. Cognitivist approaches, which focus on how people process and retain information, have proven especially effective in conservation education. This is particularly evident when using practical teaching tools such as mock-ups and video tutorials, which allow students to practise conservation techniques safely without risking damage to original artefacts. This approach has been successfully implemented in the two contexts: it is a standard teaching method at CICS, whilst at the NLPCPM, Jane Henderson's video-based instructional materials have demonstrated improvements in the staff's learning outcomes. Constructivist methodologies have proven especially valuable in advanced education, encouraging innovative problem-solving approaches. This is evident at CICS, particularly in the Master's programme, where students work independently on projects with lecturers acting as mentors. At the NLPCPM, this approach is limited to senior conservators who must develop new conservation solutions, though many conservators rarely question methods learned decades ago. The KMP aims to address this by bringing in different conservation experts to stimulate discussion about conservation methods. It seems that this approach could be particularly promising for the interns, who have not worked in this profession for so long and are more unbiased. However, this will only become apparent over time and after several courses. The rise of connectivism aligns naturally with conservation's increasingly global nature, facilitating knowledge exchange and professional networking worldwide. This approach is more accessible to CICS students, as participation in national and international conferences and guest lectures is encouraged and often integrated into the curriculum. In contrast, NLPCPM staff face significant financial barriers to engaging with international colleagues. The KMP has begun to address this by supporting NLPCPM staff to attend conferences, which has shown positive results in building professional confidence. However, this is an ongoing effort and can only be addressed in the future by encouraging staff to learn English, as it is the main conference language, and by supporting staff financially to attend conferences.

While these learning theories provide essential pedagogical frameworks, successful conservation education must also consider cultural contexts and sensitivities in their application. At CICS, this means that students should learn about the different cultural contexts of the object they are conserving, as this may change their conservation method, as it was the case with the Jaina manuscripts. This happens during diverse courses in the study programme but also by student's own research. When teaching outside one's own cultural

context, as was the case with the NLPCPM, it is of the utmost importance to gain an understanding of the cultural background. In this respect, tools such as the Culture Map can provide valuable guidance. This research calls for a shift away from Western-centric approaches, arguing for the adaptation of educational methods to local contexts and cultural values. A first step has been taken by translating the course materials into Arabic and employing an interpreter to support the staff. In designing future courses at the NLPCPM, some cultural specifics should be considered. It is very important to continue to use an interpreter for the courses or employ someone who is fluent in Arabic, because Tunisia is a high context country, as it was also experienced in the course, the staff won't give you direct feedback which could lead to some confusion. By reading the tone of the message or the underlying context, communication during the courses could improve and lead to a more sustainable outcome. It is also crucial to recognise that decisions in Tunisia are predominantly made by a top-down principle. Consequently, to effect any change in conservation approach at the NLPCPM, it is important to secure the support of the head of the lab. The establishment of trust between lecturers, the KMP, and local staff is crucial for future progress. In Tunisia, where personal relationships are fundamental to professional interactions, maintaining a consistent and predictable approach over an extended period is essential for building trust. This principle's importance is not new to the NLPCPM; historical evidence from the 1980s and 1990s shows that trust was a key factor in establishing a functioning conservation workshop. This is also one of the research's key findings: the necessity of establishing trust for successful knowledge transfer. As an outside researcher, gaining access to observe training structures in different cultural contexts proved challenging, as building the required trust relationships might require several years. This also affected data collection, the inability to use identical survey methods in Germany and Tunisia highlights the methodological challenges in cross-cultural research. Moreover, political restructuring created additional obstacles to data collection. The dependency on others made individual research particularly challenging.

Unfortunately, efforts to maintain and transfer knowledge to subsequent generations proved unsuccessful at the NLPCPM, resulting in the neglect of both the collection and the workshop facilities. The reasons for this lack of success are numerous: a significant factor was the departure of senior conservators who did not pass on their expertise, coupled with the poor payment of conservation professionals, which made it difficult to maintain staff continuity. Moreover, recurring political instabilities and the associated turnover of decision-makers have further complicated the situation.

While addressing these cultural and interpersonal challenges remains crucial, the integration of new media offers additional opportunities to enhance conservation education and knowledge transfer. To answer the question “What role can video tutorials play in the education of paper conservators?”, digital resources such as video tutorials and other learning materials can significantly improve learning outcomes. The implementation of these tools can be effectively structured through two frameworks: Bloom’s Digital Taxonomy and the SAMR model, which reveal distinct differences between CICS and NLPCPM’s educational approaches. At CICS, digital tools support learning across all taxonomic levels: from using online resources for basic knowledge acquisition (remembering), through digital documentation of objects (analysing), to creating innovative conservation solutions using advanced digital technologies, or filming video tutorials themselves. In contrast, NLPCPM’s use of digital tools primarily supports the lower taxonomic levels – remembering (through video tutorials or other digital learning material) and understanding (through digital object documentation) – with limited digital support for higher-order thinking skills such as analysis, evaluation, and creation of new approaches. These differences are further highlighted when examined through the SAMR model. While CICS has integrated technology comprehensively, from basic substitution to redefinition, in contrast, NLPCPM’s technology use remains primarily at the substitution level (watching video tutorials additionally to live demonstrations). More transformative uses of technology (modification and redefinition) are currently not implemented due to financial constraints and insufficient technical expertise. For example, advanced equipment provided by the KMP (such as digital microscopes and environmental monitoring systems) remains unused due to limited training opportunities and insufficient awareness of its potential to transform conservation practices. Nevertheless, both institutions validate Hattie’s meta-analysis findings regarding the importance of clear learning goals and feedback, although through different approaches: CICS through structured academic assessment and mentoring, and NLPCPM through practical skill evaluation and guidance from senior conservators and external experts.

While these frameworks help analyse the current state of digital integration in conservation education, examining specific contemporary pedagogical methods reveals how these tools can be effectively implemented in practice. Contemporary pedagogical methods that combine new media with active, blended, and problem-based learning have demonstrated significant success in conservation education. The flipped classroom model implemented at both CICS and NLPCPM exemplifies this approach. At some courses at CICS, students review

theoretical content via video tutorials prior to class sessions, maximising face-to-face time for practical training. The “Jigsaw Teaching in Conservation-Restoration” project further illustrates this effective integration of video tutorials into the curriculum of the book and leather conservation semester. Although students are accustomed to consuming social media content, conveying complex conservation methods through video tutorials remains challenging. The finished project, as one outcome of this dissertation, now provides a foundation of teaching materials that can be expanded in coming years. At NLPCPM, new media have proven vital in conservation courses, particularly in bridging geographical and cultural gaps, as demonstrated in Jane Henderson’s course. During the Covid pandemic, the course had to be reorganised into a flipped classroom format. This adaptation had the additional benefit of extending the course to ten weeks, allowing more time for content reflection. Providing participants with Arabic-language written and video materials before the course, along with interpreter support, resulted in improved learning outcomes, as evidenced in the final course discussion. However, despite extensive course preparation, a purely online format proved less than ideal in Tunisia’s traditional learning environment. In this context, in-person visits from lecturers would have enhanced the course and likely increased participant engagement. This experience reinforces that technological innovations should complement, rather than replace, traditional hands-on experience. Despite these challenges, the flipped classroom model has shown promise at both CICS and NLPCPM, particularly in teaching basic conservation techniques, suggesting potential for adaptation to other country’s conservation education programmes.

The academic training of conservators remains primarily concentrated in Europe and North America. In a five-year conservation programme, such as at CICS, there is sufficient time and resources to comprehensively cover preservation, conservation and restoration fundamentals. Ideally, individual teaching units build upon each other, enabling students to effectively translate theoretical knowledge into practical conservation work. Multiple lecturers provide diverse perspectives from conservation practice, while student discussions are encouraged to foster confidence in developing skills. Positive feedback contributes significantly to this development. Theoretical and practical components should maintain a careful balance to optimally prepare students for professional practice. The integration of digital media enhances conservation education and, at its best, increases student motivation.

Countries like Tunisia demonstrate a notable absence from the international conservation community, facing multiple challenges including language barriers, financial constraints limiting participation in international discourse, and distrust of Western approaches, particularly in former colonies. Conservation and conservation education in these developing or emerging countries is still in its early stages, with the profession lacking recognition and proper infrastructure. Due to the absence of academic training programmes, conservation education is primarily limited to short workshops and professional development courses led by visiting experts. While case studies show that longer community engagement periods reach more sustainable outcomes, the training of conservation professionals remains problematic. Political circumstances and low professional recognition often lead potential conservators to seek opportunities abroad or in different fields, resulting in significant regional expertise loss. To answer the second research question: “How can teaching methodologies in paper conservation be culturally adapted to ensure effective knowledge transfer between Western and non-Western educational contexts?”, developing sustainable knowledge transfer systems in these contexts requires long-term commitment and cultural adaptation. A potential solution involves establishing bilateral training programmes between universities with existing conservation courses and those without. While this bureaucratic process may take decades and isn’t feasible for every country, alternative training methods remain vital. These include specialised courses and digital media solutions, such as video tutorials that can be translated into multiple languages – an investment with potential long-term benefits. Building trust between local conservators, communities, and Western practitioners provides the essential foundation for meaningful collaboration and sustainable conservation practices. This comprehensive approach addresses both immediate training needs and long-term professional development in regions currently underserved by formal conservation education. This research demonstrates that successful conservation education requires a balanced approach that combines traditional methods with innovative technologies, whilst remaining sensitive to cultural contexts and local needs.

7.2 Recommendation for Future Research

This study points to several promising directions for future research.

Firstly, the geographical scope of research subjects should be expanded, with a particular focus on emerging countries. This would enhance understanding of knowledge transfer in conservation education. Long-term studies examining the effectiveness of tools such as the

Culture Map across diverse cultural contexts could provide valuable insights for developing more culturally sensitive teaching approaches in conservation.

Regarding cultural sensitivity in conservation education, research into the development and implementation of dedicated courses within conservation curricula is recommended. This could include the investigation of how cultural awareness impacts conservation decision-making.

The development of digital resources for conservation education presents another significant research opportunity. While the decentralised nature of conservation education presents challenges, investigating the feasibility and effectiveness of an Open Educational Resources (OER) platform specifically for conservators could enhance knowledge sharing among institutions. Such research should examine both technical requirements and user needs across different cultural contexts.

Further investigation is needed to evaluate pedagogical innovations in conservation education. Long-term studies involving multiple institutions should assess the effectiveness of flipped classroom and blended learning approaches. This research should include both quantitative measures of learning outcomes and qualitative assessment of skill development.

Furthermore, research into the potential of emerging technologies in the field of conservation education is recommended. Examinations of the application of Augmented Reality (AR), Virtual Reality (VR), and machine learning in conservation training have the potential to provide insights into their effectiveness for both theoretical understanding and practical skill development.

List of Tables and Figures

<i>Table 1 Overview summer semester 2024 planned practical works and the corresponding Video tutorials.....</i>	<i>122</i>
<i>Figure 1 EQF scale after the European Union (European Commission. Directorate General for Employment, Social Affairs and Inclusion., 2018), conservation students should be graduates on level 7 © Marlen Börngen</i>	<i>11</i>
<i>Figure 2 cultural heritage conservation training programmes globally, all disciplines © Marlen Börngen made with: https://de.batchgeo.com.....</i>	<i>14</i>
<i>Figure 3 The geographical distribution of ICOM-CC members (© ICOM-CC, 2024).....</i>	<i>16</i>
<i>Figure 4 Four Learning Theories: Behaviourism, Cognitivism, Constructivism and Connectivism and their main characteristics © Marlen Börngen.....</i>	<i>45</i>
<i>Figure 5 Blooms Digital Taxonomy Infographic (© Carranza and Sneed, 2016)</i>	<i>52</i>
<i>Figure 6 Connection between Blooms Taxonomy and the SAMR Model © Marlen Börngen.</i>	<i>54</i>
<i>Figure 7 Barometer effect size d and significance q using the example of "homework" (© Hattie and Zierer, 2020)</i>	<i>60</i>
<i>Figure 8 The Didactic Triangle with the connections between content, teacher and learner © Marlen Börngen.....</i>	<i>61</i>
<i>Figure 9 Thermometer of impact from Hattie using the example of "flipped classroom" (© Hattie, 2023, p. 374)</i>	<i>62</i>
<i>Figure 10 original CC license symbols by Creative Commons © Shaddim - https://creativecommons.org/about/downloads/https://creativecommons.org/policies/Original CC license icons licensed under CC BY 4.0, CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=47247325.</i>	<i>75</i>
<i>Figure 11 results question one: In which semester are you studying?</i>	<i>82</i>
<i>Figure 12 results question two: Have you already completed a course of study or training? If so, which one?.....</i>	<i>83</i>
<i>Figure 13 results question three: What did you specialise in during your pre-study internship? Graphics, book, archive, exhibition, other?</i>	<i>84</i>
<i>Figure 14 results question four: Have there been any topics in your studies, pre-study work placement or training where you would have liked a visual explanation (practical demonstration, video or at least pictures)? In the practical units or also in the scientific subjects?.....</i>	<i>85</i>
<i>Figure 15 results question five: Are there any topics/procedures/techniques during your studies, pre-study work placement or training that you were afraid to ask about because you had the feeling that everyone else took them for granted, e.g. making paste, closing tears, sharpening leather, knotting stitching thread?</i>	<i>86</i>
<i>Figure 16 results question six: Which conservation/restoration technique have you heard of but not found any (sufficient) literature or explanation? e.g. posts on social media (soaking with surfactants).....</i>	<i>87</i>

<i>Figure 17 results question seven: What problems/questions do you encounter when reading specialized articles, e.g. incomplete recipe details, imprecise description of how to carry out the recipe or linguistic hurdles in English-language texts?</i>	<i>88</i>
<i>Figure 18 results question eight: Have you already made videos about conservation techniques to help you remember them later? If so, which technique?</i>	<i>89</i>
<i>Figure 19 result question nine: How long can you really pay attention to a video or PowerPoint? 5min, 10 min or longer?</i>	<i>90</i>
<i>Figure 20 result question ten: Which of the following interest groups best matches your personal competences: the 'practical restorer', the 'chemical analyst', the 'restoration technician', the 'restoration mediator' or the future 'manager'?</i>	<i>91</i>
<i>Figure 21 excerpt from the storyboard of "volatile binders". © Tamara Zraggen</i>	<i>96</i>
<i>Figure 22 Working situation during filming, conservator Maike Linden, one employee of the media office TH Köln and Tamara Zraggen (from left to right) filming a sequence of the video tutorial "Water Solubility Test", © Marlen Börngen</i>	<i>97</i>
<i>Figure 23 Film excerpt from the video "volatile binders"</i>	<i>97</i>
<i>Figure 24 QR code for the video tutorial "volatile binders" (in German)</i>	<i>99</i>
<i>Figure 25 Most of the students strongly agreed (75 %) with the statement "I always watched the recommended videos before workshop work" asked in question 1. This indicates a very high usage of the recommended videos in this semester.....</i>	<i>101</i>
<i>Figure 26 The majority of respondents (87,5 %) agree or strongly agree with the statement "The video tutorials have increased my motivation for the practical work". This indicates that the video tutorials have a positive effect on the motivation of the participants.</i>	<i>101</i>
<i>Figure 27 The analysis of question 3 shows that the majority of respondents (87,5 %) agree or strongly agree that they follow up on the content of the workshop work. One respondent (12,5 %) stated that they do this to some extent. This indicates that most participants find the follow-up important, but there is room for greater motivation in relation to the follow-up of the workshop time.</i>	<i>102</i>
<i>Figure 28 The analysis of question 4 shows that the majority of respondents (75 %) strongly agree with the statement "I can imagine using the video tutorials again later as a reminder". A quarter of respondents (25 %) agree. This indicates that the video tutorials are seen as a valuable resource for the future.....</i>	<i>102</i>
<i>Figure 29 The analysis of question 5 shows that half of respondents (50 %) agree with the statement "Compared to the previous semester (parchment), I have the feeling that I can follow the course material better this semester". One third (33,3 %) is neutral to the statement and one person disagree (16,7%). This indicates that most participants perceive an improvement in their understanding of the course material compared to the previous semester. However, there is still potential for improvement here in order to include all students in the process. Also some students from the first semester did answer the question even though they didn't had a parchment semester at this time of the survey.....</i>	<i>103</i>
<i>Figure 30 The analysis of question 6 shows that all respondents agree (62,5 %) or strongly agree (37,5%) with the statement "The video tutorials help me to understand the learning material better". This indicates that the video tutorials are seen as an effective means of improving understanding of the learning material.</i>	<i>103</i>

<i>Figure 31 There is a strong interest in more video tutorials in the future. Participants agreed or strongly agreed with this statement (87,5 %). Only one person was neutral to this statement.</i>	<i>104</i>
<i>Figure 32 The evaluation of the scheme shows that the majority of respondents (75 %) strongly agree or agree with the statement “I would also like other lectures to be held using the flipped classroom concept”, while 12,5 % are neutral or disagree. This indicates that there is an interest in using the flipped classroom concept in other lectures. However, there are probably still uncertainties regarding the implementation of the format.</i>	<i>104</i>
<i>Figure 33 Most participants have the feeling that they can determine their own learning pace (87,5 %), even if the answers diverge somewhat more strongly here. One person disagree (12,5 %).....</i>	<i>105</i>
<i>Figure 34 Question 10 is similar to question 9, with the majority of respondents agreeing or strongly agree (87,5 %) with the statement “I can acquire learning content flexibly in terms of time”. However, there is also room for improvement here, as the answers differed greatly. One person even disagreed with this statement.</i>	<i>105</i>
<i>Figure 35 Most participants (87,5 %) do not feel that the workshop work takes up a lot of time compared to other courses. One person, on the other hand, is rather unsure (neutral) about this, which probably has to do with the high workload during the semesters.</i>	<i>105</i>
<i>Figure 36 The participants felt that the preparation provided by the video tutorials was sufficient but could be improved, with most answers in the middle of the scale (62,5 %). ...</i>	<i>106</i>
<i>Figure 37 Most participants disagree or strongly disagree (62,5 %) do not find watching the video tutorials very time-consuming. 25 % were neutral. The answers certainly also depend on how many videos are to be watched in preparation. This varies greatly from week to week.</i>	<i>106</i>
<i>Figure 38 This pattern indicates that the video tutorials are generally perceived as clearly structured with 100 % agree or strongly agree.</i>	<i>106</i>
<i>Figure 39 The evaluation of this question indicates that the participants consider the length of the video tutorials to be appropriate with 75 % strongly disagree or disagree and 25 % neutral.</i>	<i>107</i>
<i>Figure 40 All participants strongly agree or agree with the statement „The discussions with the lecturers during workshop time help me to better understand certain content“. This indicates that the participants find the discussions with the lecturers during workshop time very helpful for understanding certain content.....</i>	<i>107</i>
<i>Figure 41 The evaluation of this question indicates that the participants find the video tutorials helpful for structuring the workshop work, with some perceiving this more strongly than others. 50 % agree or strongly agree whereas 50 % are neutral.....</i>	<i>107</i>
<i>Figure 42 All participants watch the tutorials at least once, although most participants watch the tutorials twice (62,5 %). The tutorials are well received as preparation.</i>	<i>108</i>
<i>Figure 43 The analysis of the diagram shows that 62,5 % of respondents watch the video tutorials once as a follow-up. The other 37,5 % watch them twice. This indicates that the participants regularly use the tutorials for follow-up.....</i>	<i>108</i>
<i>Figure 44 Presentation of the typology of explanatory films according to © Wolf (2015), terms are translated by the author.</i>	<i>112</i>

<i>Figure 45 former french colonies and their independence, © Deutsche Welle, https://www.dw.com/de/frankreich-und-afrika-abnabeln-in-zeitlupe/a-54245021 (accessed 09.09.2024).</i>	129
<i>Figure 46 Inside the Great Mosque of Kairouan. At the back left of the picture, there is a small room, the maqṣūra, surrounded by a brown wall decorated with wooden ornaments. picture made at a visit by the author in 2022, © Marlen Börngen.</i>	131
<i>Figure 47 Manuscript on paper with insect infestation, taken from page 6 of Roswitha Ketzers final report, file BAV 250-TUNI/35853</i>	133
<i>Figure 48 Floor plan of the originally planned workshop in Raqqada taken from Günter Brannahl's 1984 report, file BAV 250-TUNI/35853.</i>	134
<i>Figure 49 Storage of the manuscripts as a loose-leaf collection in slipcases and boxes, taken from page 6 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853</i>	135
<i>Figure 50 Storage of the manuscripts in steel cabinets, taken from page 9 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853</i>	135
<i>Figure 51 During one of Günter Brannahls visits, he separated several clumped fragments from each other and dried them in the air. These were then stored in a better ventilated magazine, taken from page 11 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853</i>	136
<i>Figure 52 New, unsuitable built-in cupboards in which fragments were already stored, taken from page 10 of Günter Brannahl's 1984 report, file BAV 250-TUNI/35853</i>	136
<i>Figure 53 one of the workrooms in the Tunisian lab taken from page 9 of Roswitha Ketzers final report, file BAV 250-TUNI/35853</i>	138
<i>Figure 54 Professor Jane Henderson delivering a lecture on Zoom, while the lab staff from the NLPCPM is present in the lab. © Wadie Missaoui</i>	143
<i>Figure 55 iceberg model after Edward Hall (1989), the terms are only examples and do not claim to be complete. The terms are arranged in a hierarchical structure, with the most visible terms appearing at the top and the least visible terms at the bottom, in relation to the culture of groups of people. © Marlen Börngen.</i>	158
<i>Figure 56 Country Mapping 2022 of Germany. © Erin Meyer</i>	162
<i>Figure 57 Country Mapping 2022 of Germany (red) and Tunisia (yellow). © Erin Meyer.</i>	163

Bibliography

- Achille, C. and Fiorillo, F. (2022) 'Teaching and Learning of Cultural Heritage: Engaging Education, Professional Training, and Experimental Activities', *Heritage*, 5(3), pp. 2565–2593. Available at: <https://doi.org/10.3390/heritage5030134>.
- AIC (1994) *Code of Ethics and Guidelines for Practice*. Available at: <https://www.culturalheritage.org/about-conservation/code-of-ethics>.
- Al Khatib, R. et al. (eds) (2010) *Cultural policies in Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria and Tunisia: an introduction*. Brussels: Culture Resource (Al Mawred Al Thaqafy).
- Alla, X. (2024) 'Lifelong Learning', *Interdisciplinary Journal of Research and Development*, 11(1), p. 27. Available at: <https://doi.org/10.56345/ijrdv11n105>.
- Ambassadors Fund for Cultural Preservation* (no date) *U.S. Embassy in Tunisia*. Available at: <https://tn.usembassy.gov/education-culture/cultural-programs/ambassadors-fund-for-cultural-preservation/> (Accessed: 9 September 2024).
- American Institute for Conservation (2009) 'Book and Paper Group Wiki', *AIC A Collaborative Knowledge Resource, Book and Paper Group*. Available at: https://www.conservationwiki.com/w/index.php?title=Book_and_Paper_Group_Wiki&oldid=65777.
- Antomarchi, C. et al. (1996) 'PREMA: A Training Strategy for a Change or "Let's Stop Building Castles in the Sand"', in *ICOM Committee for Conservation 11th Triennial Meeting*. Edinburgh: James & James.
- Antomarchi, C. and Little, T.L. (1993) 'Multicultural Training: A Rich Mosaic or an Impossible Puzzle?', in *ICOM Committee for Conservation 10th Triennial Meeting*. Washington DC USA: James & James (Triennial Meeting; 10).
- Arnold, P. (2005) *Einsatz digitaler Medien in der Hochschullehre aus lerntheoretischer Sicht*. Available at: <https://www.e-teaching.org/didaktik/theorie/lerntheorie/arnold.pdf> (Accessed: 14 June 2024).
- Bakhri, S., Sumichan, L. and Putri, G.F. (2022) 'Change Comes from Within: Shared Efforts in Developing Conservation in Indonesia', *Studies in Conservation*, 67(sup1), pp. 1–9. Available at: <https://doi.org/10.1080/00393630.2022.2079893>.

- Baumgartner, P. and Payr, S. (2001) 'Erfinden lernen', in H. Von Foerster et al. (eds) *Konstruktivismus und Kognitionswissenschaft: kulturelle Wurzeln und Ergebnisse: Heinz von Foerster gewidmet*. 2., aktualisierte und erw. Aufl. Wien ; New York: Springer.
- Bayram, M.B. (1897) 'al-Qayrawän', *Al-Muqataṭaf*, April 1 / 28 Shawwāl, 1314, pp. 241–246.
- Beautemps, J. and Bresges, A. (2021) 'What Comprises a Successful Educational Science YouTube Video? A Five-Thousand User Survey on Viewing Behaviors and Self-Perceived Importance of Various Variables Controlled by Content Creators', *Frontiers in Communication*, 5, p. 600595. Available at: <https://doi.org/10.3389/fcomm.2020.600595>.
- Belgacem, O. (2010) 'Tunisia', in *Cultural policies in Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria and Tunisia: an introduction*. Brussels: Culture Resource (Al Mawred Al Thaqafy).
- Bell, E., Bryman, A. and Harley, B. (2022) 'Focus Groups', in *Business Research Methods*. Oxford University Press. Available at: <https://doi.org/10.1093/hebz/9780198869443.003.0033>.
- Beny, A., MacLaren, D. and Hilali, A. (2019) 'Results of an initial collection needs assessment by the Kairouan Manuscript Project'.
- Berglund, A. and Lister, R. (2010) 'Introductory programming and the didactic triangle', in *IFAC Symposium on Advances in Control Education*. Available at: <https://api.semanticscholar.org/CorpusID:14858864>.
- Bernhardt, S., Rietzke, D. and Grieshop, M. (2022) 'Qualitätskriterien für die Erstellung von Lehr- /Lernvideos im Studium von Hebammen: Eine empirische Studie'. e-teaching.org. Available at: https://www.eteaching.org/etresources/pdf/erfahrungsbericht_2022_bernhardt_rietzke-grieshop_%20lernvideos.pdf (Accessed: 17 May 2024).
- Bloom, B.S. (ed.) (1956) *Taxonomy of educational objectives: the classification of educational goals. Handbook 1, Cognitive domain ; by a committee of college and university examiners ; Benjamin S. Bloom, editor [and others]*. [1st ed.]. London: Longman Group.
- Brame, C.J. (2015) *Effective educational videos*. Available at: <http://cft.vanderbilt.edu/guides-sub-pages/effective-educational-videos/> (Accessed: 17 May 2024).
- Brame, C.J. (2019) 'Active Learning', in *Science Teaching Essentials*. Elsevier, pp. 61–72. Available at: <https://doi.org/10.1016/B978-0-12-814702-3.00004-4>.

- Braun, C. (2018) *Gutachten für Wertigkeit der akademischen Abschlüsse Diplom FH im Bereich Konservierung und Restaurierung von Kunst- und Kulturgut in Deutschland im Vergleich zum Bachelor/Master-System bzw. zur Einordnung in das Punktesystem des Deutschen bzw. Europäischen Qualifikationsrahmens (DQR/EQR) anhand der Entwicklung der Hochschulausbildungen im Zeitraum 1970-2015*. Gutachten. Verband der Restauratoren e.V.
- Bremer, C., Krömker, D., and Gesellschaft für Medien in der Wissenschaft (eds) (2013) *E-Learning zwischen Vision und Alltag: zum Stand der Dinge*. Münster New York München Berlin: Waxmann (Medien in der Wissenschaft, 64).
- Brockop, J. and KMP (2022) *The Manuscripts*. Available at: <https://www.csmc.uni-hamburg.de/kairouan/manuscripts.html> (Accessed: 10 September 2024).
- Brockop, J.E. (2023) 'The Kairouan manuscript collection', in Stewart, C. C. and Binbīn, A. Š., *Manuscripts and Arabic-script writing in Africa*. al-Iskandarīyah, Miṣr: Hay'at al-Makhtūtāt al-Islāmīyah bi-al-ta'āwun ma'a Maktabat al-Iskandarīyah, pp. 82–104.
- Brockopp, J. (2020) 'Virtual training in Emergency Preparedness and Response', 28 June. Available at: <https://www.csmc.uni-hamburg.de/kairouan/news/2020-06-28.html>.
- Brockopp, J.E. (2024) 'Early Mālikī Manuscripts: A Retrospective', *Asiatische Studien - Études Asiatiques*, 78(1), pp. 3–17. Available at: <https://doi.org/10.1515/asia-2024-0007>.
- Brown, J. (ed.) (2014) 'Conservation Education & Training in Africa, Asia & Latin America'. ICOM CC Education & Training Working Group e Journal.
- Brown, J.E. and Todd, S. (2008) 'The development of the online preventive conservation MA at Northumbria University and the integration of haptic sensory technology', in *Preprints. 1*. New Delhi: Allied Publ.
- Brückle, I. (2019) 'The Development of Skill Knowledge in Conservation', *Restaurator. International Journal for the Preservation of Library and Archival Material*, 40(3–4), pp. 287–310. Available at: <https://doi.org/10.1515/res-2019-0016>.
- Bundeszentrale für politische Bildung (2016) *60 Jahre tunesische Unabhängigkeit*, *bpb.de*. Available at: <https://www.bpb.de/kurz-knapp/hintergrund-aktuell/223304/60-jahre-tunesische-unabhaengigkeit/> (Accessed: 22 August 2024).
- Bundeszentrale für politische Bildung (n.d.) *Entwicklungsländer*, *bpb.de*. Available at: <https://www.bpb.de/kurz-knapp/lexika/lexikon-der-wirtschaft/19220/entwicklungslaender/> (Accessed: 20 August 2024).

- Burdinski, D. and Glaeser, S. (2016) ‘Flipped Lab - Effektiver lernen in einem naturwissenschaftlichen Grundlagenpraktikum mit großer Teilnehmerzahl’, *Neues Handbuch Hochschullehre* [Preprint]. Edited by B. Berendt et al.
- Byrne-Sutton, Q. (ed.) (1995) *La restauration des objets d’art: Aspects juridiques et éthiques ; actes d’une rencontre organisée le 17 octobre 1994 = The restoration of works of art*. Zürich: Schulthess Polygraph. Verl. (Études en droit de l’art).
- Carranza, R. and Sneed, O. (2016) *Blooms Digital Taxonomy*. Available at: https://teachonline.asu.edu/wp-content/uploads/2016/05/Blooms_digital.jpg (Accessed: 26 July 2024).
- Cassar, M. (2003) ‘Education and training needs for the conservation and protection of cultural heritage: Is it a case of “one size fits all”?’ , *5th European Commission on Research for the Protection of Cultural Heritage: A Pan European Challenge.*, pp. 159–163.
- Chassaing, P. and Gailhbaud, A. (no date) ‘Valuing the quality of mutual understanding among heritage professionals in a global network’, in *Transcending Boundaries: Integrated Approaches to Conservation. ICOM-CC 19th Triennial Conference Preprints, Beijing, 17–21 May 2021*.
- Chitra, A.P. and Raj, M.A. (2018) ‘E-Learning’, *Journal of Applied and Advanced Research*, pp. S11–S13. Available at: <https://doi.org/10.21839/jaar.2018.v3iS1.158>.
- Churches, A. (2007) ‘Bloom’s Digital Taxonomy’. Available at: <https://www.pdst.ie/sites/default/files/BloomDigitalTaxonomy-AndrewChurches.pdf> (Accessed: 11 July 2024).
- Ciesielska, M., Boström, K.W. and Öhlander, M. (2018) ‘Observation Methods’, in *Qualitative Methodologies in Organization Studies*. Cham: Springer International Publishing, pp. 33–52. Available at: https://doi.org/10.1007/978-3-319-65442-3_2.
- Collins, J.W. and O’Brien, N.P. (eds) (2003) *The Greenwood dictionary of education*. Westport, Conn: Greenwood Press.
- Cotte, S., Nock, D. and Dorji, S. (2008) *A handbook of preventive conservation in Bhutan (Himalayas)*. New Delhi: Allied Publ (ICOM Committee for Conservation, 15th Triennial Meeting New Delhi India).
- Cram, F. (2009) ‘Maintaining indigenous voices’, in Mertens, D. and Ginsberg, P., *The Handbook of Social Research Ethics*. 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc., pp. 308–322. Available at: <https://doi.org/10.4135/9781483348971>.

- Criswell, J. *et al.* (2008) *Beyond cultural sensitivity and toward cultural centeredness: insights into the preservation of Alaskan spruce root basketry*. New Delhi, India: Allied Publ (ICOM Committee for Conservation 15th Triennial Meeting).
- CSMC (2022) 'Kairouan Manuscript Project Starts 2022 Training in Collection Care and Management', 24 March. Available at: <https://www.csmc.uni-hamburg.de/news/2022-03-24-kmp-training.html>.
- DaCosta, B. and Kinsell, C. (2022) 'Serious Games in Cultural Heritage: A Review of Practices and Considerations in the Design of Location-Based Games', *Education Sciences*, 13(1), p. 47. Available at: <https://doi.org/10.3390/educsci13010047>.
- Dardes, K. (2002) 'New educational strategies for conservation: how the Internet is changing how we teach and learn', in *Internationaler Museumsrat, 13th triennial meeting, Rio de Janeiro, 22 - 27 September 2002 / ICOM Committee for Conservation: preprints*. London: James & James.
- Denzin, N.K. and Lincoln, Y.S. (2005) 'The Discipline and Practice of Qualitative Research', in. Available at: <https://api.semanticscholar.org/CorpusID:149701443>.
- Di Pietro, G. and Broers, N. (eds) (2024) *Education and Pedagogy. CONSERVATION 360°, (3)*. edUPV. Available at: <https://doi.org/10.4995/360.2024.670101>.
- Di Pietro, G., Buder, A. and Künzel, M. (2021) *Improving transfer in the education of conservators-restorers*.
- Dolmans, D.H.J.M. *et al.* (2016) 'Deep and surface learning in problem-based learning: a review of the literature', *Advances in Health Sciences Education*, 21(5), pp. 1087–1112. Available at: <https://doi.org/10.1007/s10459-015-9645-6>.
- Dudenredaktion (2024) *Erklärvideo, Duden*. Available at: <https://www.duden.de/node/288364/revision/1253809>.
- E.C.C.O. (2004) 'ECCO professional guidelines III'. Available at: https://www.ecco-eu.org/wp-content/uploads/2021/01/ECCO_professional_guidelines_III.pdf.
- Eide, P. and Allen, C.B. (2005) 'Recruiting Transcultural Qualitative Research Participants: A Conceptual Model', *International Journal of Qualitative Methods*, 4(2), pp. 44–56. Available at: <https://doi.org/10.1177/160940690500400204>.
- ENCoRE (ed.) (2004) 'Newsletter/ENCoRE, European Network for Conservation, Restoration Education'.
- ENCoRE General Assembly (2001) 'Clarification of Conservation/Restoration Education at University Level or Recognised Equivalent'.

- Erez, M. and Earley, P.C. (1993) *Culture, self-identity, and work*. New York: Oxford University Press.
- European Commission. Directorate General for Employment, Social Affairs and Inclusion. (2018) *The European qualifications framework: supporting learning, work and cross border mobility : 10th anniversary*. LU: Publications Office. Available at: <https://data.europa.eu/doi/10.2767/385613> (Accessed: 1 January 2025).
- Experiential Learning | Center for Teaching & Learning* (no date). Available at: https://www.bu.edu/ctl/ctl_resource/experiential-learning/ (Accessed: 28 June 2024).
- Faleh, M. (2019) 'Restoration of Tangible and Intangible Artefacts in the Tunisian Landscape: "Boutique Hotels" and the Entrepreneurial Project of Dar Ben-Gacem', *Journal of Heritage Management*, 4(1), pp. 22–35. Available at: <https://doi.org/10.1177/2455929619852863>.
- Falser, M.S. and Lipp, W. (2010) 'Preface of ICOMOS Austria to the Vienna Conference', in International Scientific Committee for the Theory and the Philosophy of Conservation and Restoration, A. Tomaszewski, and A. Riegl (eds) *Conservation and preservation: interactions between theory and practice: in memoriam Alois Riegl (1858-1905): proceedings of the International Conference of the ICOMOS International Scientific Committee for the Theory and the Philosophy of Conservation and Restoration, 23-27 April 2008, Vienna, Austria*. Firenze: Polistampa.
- de Fazio, F. (2023) *The silent downfall of Tunisian democracy: what happened after the Arab Spring?*, *Tra i Leoni*. Available at: <https://traileoni.it/2023/05/the-silent-downfall-of-tunisian-democracy-what-happened-after-the-arab-spring/> (Accessed: 22 August 2024).
- Felder, R. and Brent, R. (2009) 'Active learning: An introduction', *ASQ Higher Education Brief*, 2.
- Findeisen, S., Horn, S. and Seifried, J. (2019) 'Lernen durch Videos – Empirische Befunde zur Gestaltung von Erklärvideos', *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung*, pp. 16–36. Available at: <https://doi.org/10.21240/mpaed/00/2019.10.01.X>.
- Finn, A.N. et al. (2009) 'A Meta-Analytical Review of Teacher Credibility and its Associations with Teacher Behaviors and Student Outcomes', *Communication Education*, 58(4), pp. 516–537. Available at: <https://doi.org/10.1080/03634520903131154>.

- Foronda, C.L. (2008) 'A Concept Analysis of Cultural Sensitivity', *Journal of Transcultural Nursing*, 19(3), pp. 207–212. Available at: <https://doi.org/10.1177/1043659608317093>.
- Francis, K. (2021) 'The absence of black and ethnic minority representation in UK heritage conservation and the value of including diverse voices', *Journal of the Institute of Conservation*, 44(3), pp. 183–196. Available at: <https://doi.org/10.1080/19455224.2021.1974066>.
- Fu, C.-C. (2005) 'Cultural sensitivity towards intangible values in monuments and sites - A comparison between Eastern Asian and Western countries.', in *Monuments and sites in their setting - conserving cultural heritage in changing townscapes and landscapes. 15th ICOMOS General Assembly and International Symposium, Xi'an China*.
- Gijbels, D. *et al.* (2005) 'Effects of Problem-Based Learning: A Meta-Analysis From the Angle of Assessment', *Review of Educational Research*, 75(1), pp. 27–61. Available at: <https://doi.org/10.3102/00346543075001027>.
- Gillis, A.S., Lutkevich, B. and Aberle, L. (2024) *What is the law of diminishing returns? | Definition from TechTarget, Search Customer Experience*. Available at: <https://www.techtarget.com/searchcustomerexperience/definition/law-of-diminishing-returns> (Accessed: 24 January 2025).
- Gimondi, C. (ed.) (2000) *CONBEFOR, ricerca comparata: Conservatori restauratori di beni culturali in Europa ; Centri ed istituti di formazione*. Lurano (Bergamo): Associazione Giovanni Secco Suardo.
- Glass, G.V. (2015) 'Meta-Analysis at Middle Age: A Personal History', *Research Synthesis Methods*, 6(3), pp. 221–231. Available at: <https://doi.org/10.1002/jrsm.1133>.
- Glassner, A. and Back, S. (2020) 'Three “Gogies”: Pedagogy, Andragogy, Heutagogy', in Glassner, A. and Back, S., *Exploring Heutagogy in Higher Education*. Singapore: Springer Singapore, pp. 59–74. Available at: https://doi.org/10.1007/978-981-15-4144-5_5.
- Goerigk, C. and Schmithüsen, F. (2019) 'Allgemeine Psychologie I: Konditionierung', in Goerigk, C. and Schmithüsen, F., *Der Psycho-Comic*. Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 93–100. Available at: https://doi.org/10.1007/978-3-662-59072-0_10.

- von der Goltz, M. (2022) 'Education in the art and Conservation Field in German Countries', in Dupré, S. and Boulboulle, J., *Histories of Conservation and Art History in Modern Europe*. 1st edn. New York: Routledge, pp. 110–126. Available at: <https://doi.org/10.4324/9781003127369-10>.
- Google LLC (no date) 'google forms'. Available at: <https://www.google.com/forms/about/>.
- Götz, T. et al. (2011) *Emotion, Motivation und selbstreguliertes Lernen*. 1st edn. Stuttgart, Deutschland: utb GmbH. Available at: <https://doi.org/10.36198/9783838534817>.
- Grainger, K., Mills, S. and Sibanda, M. (2010) "'Just tell us what to do': Southern African face and its relevance to intercultural communication', *Journal of Pragmatics*, 42(8), pp. 2158–2171. Available at: <https://doi.org/10.1016/j.pragma.2009.12.017>.
- Grogorick, L. and Robra-Bissantz, S. (2021) 'Digitales Lernen und Lehren: Führt Corona zu einer zeitgemäßen Bildung?', *HMD Praxis der Wirtschaftsinformatik*, 58(6), pp. 1296–1312. Available at: <https://doi.org/10.1365/s40702-021-00806-z>.
- Grosch, W. (2020) *Lehre in Zeiten von Corona*. Available at: https://www.th-koeln.de/hochschule/lehre-in-zeiten-von-corona_76192.php (Accessed: 27 September 2024).
- Guichen, G. de (1998) 'The Pavia Document: towards a European profile of the conservator-restorer', in *Museum international, L, 3. European Summit on Preservation of Cultural Heritage: Towards a European Profile of the Conservator-Restorer, Pavia, Italy, 1997*.
- Guo, P.J., Kim, J. and Rubin, R. (2014) 'How video production affects student engagement: an empirical study of MOOC videos', in *Proceedings of the first ACM conference on Learning @ scale conference. L@S 2014: First (2014) ACM Conference on Learning @ Scale*, Atlanta Georgia USA: ACM, pp. 41–50. Available at: <https://doi.org/10.1145/2556325.2566239>.
- Hahn, O. (2012) 'Analytical techniques in art, archaeology and conservation science', *Analytical and Bioanalytical Chemistry*, 402(4), pp. 1411–1411. Available at: <https://doi.org/10.1007/s00216-011-5586-y>.
- Häkäri, A. (2008) 'The use of conservation internships to establish the foundation for preserving African cultural heritage', in *ICOM Committee for Conservation 15th Triennial Meeting New Delhi India 22-26 September 2008*. New Delhi: Allied Publ.
- Hall, E.T. (1989) *Beyond culture*. Anchor Books ed. New York: Anchor Books.
- Harb, C. (2016) 'The Arab Region: Cultures, Values, and Identities', in M.M. Amer and G.H. Awad (eds) *Handbook of Arab American psychology*. New York: Routledge, pp. 3–19.

- Harder, S. (no date) 'Lehrvideos. Einsatzmöglichkeiten im berufsbegleitenden Studium'. Available at: <https://www.uni-rostock.de/storages/uni-rostock/UniHome/Weiterbildung/KOSMOS/Lehrvideos.pdf>.
- Hase, S. and Kenyon, C. (2001) 'Moving from andragogy to heutagogy: implications for VET', in *Proceedings of Research to Reality: Putting VET Research to Work: Australian Vocational Education and training Research Association (AVETRA)*. Adelaide. Available at: <https://researchportal.scu.edu.au/esploro/outputs/conferencePaper/Moving-from-andragogy-to-heutagogy-implications/991012820997202368/filesAndLinks?index=0>.
- Haspel, J., Staroste, H., and Landesdenkmalamt Berlin (eds) (2014) *Denkmalpflege in der DDR: Rückblicke*. Erstaufl. Berlin: Nicolai (Beiträge zur Denkmalpflege in Berlin, 41).
- Hattie, J. (2009) *Visible learning: a synthesis of over 800 meta-analyses relating to achievement*. London ; New York: Routledge.
- Hattie, J. (2012) *Visible learning for teachers: maximizing impact on learning*. London ; New York: Routledge.
- Hattie, J. et al. (2013) *Lernen sichtbar machen*. Überarb. deutschsprachige Ausg. Baltmannsweiler: Schneider-Verl. Hohengehren.
- Hattie, J. (2015) 'Teacher-ready Research Review: The Applicability of Visible Learning to Higher Education', *Scholarship of Teaching and Learning in Psychology*, 1, pp. 79–91.
- Hattie, J. (2023) *Visible Learning: The Sequel: A Synthesis of Over 2,100 Meta-Analyses Relating to Achievement*. 1st edn. London: Routledge. Available at: <https://doi.org/10.4324/9781003380542>.
- Hattie, J. and Timperley, H. (2007) 'The Power of Feedback', *Review of Educational Research*, 77(1), pp. 81–112. Available at: <https://doi.org/10.3102/003465430298487>.
- Hattie, J. and Zierer, K. (2020) *Visible Learning: auf den Punkt gebracht*. 2. unveränderte Auflage. Baltmannsweiler: Schneider Verlag Hohengehren GmbH.
- Hazelkorn, E. and Locke, W. (2021) 'Blended learning is dead, long live blended learning!', *Policy Reviews in Higher Education*, 5(1), pp. 1–4. Available at: <https://doi.org/10.1080/23322969.2021.1873348>.
- Henderson, J. (2020) 'Beyond lifetimes: who do we exclude when we keep things for the future?', *Journal of the Institute of Conservation*, 43(3), pp. 195–212. Available at: <https://doi.org/10.1080/19455224.2020.1810729>.

- Henderson, J. *et al.* (2021) ‘Preventive conservation training: A partnership between the UK and Myanmar’.
- Henderson, J. and Parkes, P. (2021) ‘Using complexity to deliver standardised educational levels in conservation’, *ICOM Committee for Conservation 19th Triennial Meeting Beijing* [Preprint].
- Hennink, M.M. (2008) ‘Language and Communication in Cross-Cultural Qualitative Research’, in *Social Indicators Research Series*. Dordrecht: Springer Netherlands, pp. 21–33. Available at: https://doi.org/10.1007/978-1-4020-8567-3_2.
- Heritage, A. (2024) ‘EXPERIENTIAL CONSERVATION TRAINING At the Auschwitz-Birkenau State Museum’, *Conservation Perspective The GCI Newsletter*. Edited by P. Pardo, Volume 39(Number 2), pp. 10–13.
- Hernández-Sabaté, A. *et al.* (2024) ‘From traditional teaching to flipped classroom: Impact on learning in engineering degrees’, *Journal of Technology and Science Education*, 14(3), p. 798. Available at: <https://doi.org/10.3926/jotse.2623>.
- Hischier, D.S. (2017) *Meta-kognitive Strategien - der Faktor unter der Lupe*. Available at: https://www.lernensichtbarmachen.ch/wp-content/uploads/2017/01/Faktor-unter-Lupe_Meta-kognitive-Strategien_Final.pdf (Accessed: 25 July 2024).
- Hofstede, G. (2013) *Culture’s consequences: comparing values, behaviors, institutions, and organizations across nations*. 2. ed. [Nachdr.]. Thousand Oaks, Calif.: Sage.
- Hofstede, G., Hofstede, G.J. and Minkov, M. (2010) *Cultures and organizations: software of the mind: intercultural cooperation and its importance for survival*. Revised and expanded third edition. New York, NY: McGraw-Hill.
- Hutchings, J. and Corr, S. (2012) ‘A framework for access to the conservation–restoration profession via the mapping of its specialist competencies’, *Higher Education*, 63(4), pp. 439–454. Available at: <https://doi.org/10.1007/s10734-011-9450-y>.
- IADA (no date) *Veranstaltungen, IADA*. Available at: <https://iada-home.org/de/veranstaltungen/> (Accessed: 24 October 2024).
- ICCROM Website (2020) *Communication and Teaching Skills in Conservation and Science | ICCROM*. Available at: <https://www.iccrom.org/courses/communication-and-teaching-skills-conservation-and-science-1> (Accessed: 11 August 2024).
- ICCROM Website (no date) *Courses | ICCROM*. Available at: <https://www.iccrom.org/what-we-do/courses> (Accessed: 24 October 2024).
- ICOM (1984) ‘The Conservator-Restorer: a Definition of the Profession’. Available at: <https://www.icom-cc.org/en/definition-of-the-profession-1984>.

- ICOM CC (2024) *ICOM-CC | Working Groups*. Available at: <https://www.icom-cc.org/en/working-groups/list> (Accessed: 24 October 2024).
- ICOM-CC (2024) 'ICOM-CC members live and work in over 110 countries'. Available at: <https://www.icom-cc.org/en/icom-cc-worldwide-presence>.
- ICOMOS (2013) *The Burra Charter: The Australia ICOMOS charter for places of cultural significance 2013*. Burwood, VIC, Australia: Australia ICOMOS Incorporated.
- ICOMOS – ICORP (no date) *Training courses, ICOMOS - ICORP*. Available at: <https://icorp.icomos.org/index.php/training-courses/> (Accessed: 24 October 2024).
- Icon (no date) *Events*. Available at: <https://www.icon.org.uk/events.html> (Accessed: 24 October 2024).
- Ipert, S.J. (2016) 'Preservation and Digitization Activities in Arabic- and Farsi-Speaking Countries', *Preservation, Digital Technology & Culture*, 45(2), pp. 63–75. Available at: <https://doi.org/10.1515/pdte-2016-0016>.
- Irvine, F., Roberts, G. and Bradbury-Jones, C. (2008) 'The Researcher as Insider Versus the Researcher as Outsider: Enhancing Rigour Through Language and Cultural Sensitivity', in P. Liamputtong (ed.) *Doing Cross-Cultural Research*. Dordrecht: Springer Netherlands (Social Indicators Research Series), pp. 35–48. Available at: https://doi.org/10.1007/978-1-4020-8567-3_3.
- Jae Gutierrez, J., D.J. Wickens, J. and Hess Norris, D. (2011) 'Connecting Conservation and Education to Academic, Public, and Allied Communities', *ICOM Committee for Conservation 16th Triennial Meeting Lisbon Portugal* [Preprint].
- Janposri, K. (1990) 'The need for Training Personnel for the Conservation of Cultural Heritage in ASEAN Countries', in *9th triennial meeting: Dresden, German Democratic Republic ; 26-31 September, 1990*. Marina del Rey, Ca: The Getty Conservation Institute (Reprints / ICOM Committee for Conservation).
- John Hattie (no date) *VISIBLE LEARNING*. Available at: <https://visible-learning.org/john-hattie/> (Accessed: 26 January 2023).
- Johnson, J. et al. (2014) *Collaboration, Sustainability, and Reconciliation: Teaching Cultural Heritage Preservation and Managment in Iraq. ICOM-CC Triennial conference*, Paris: International Council of Museums (Preprints ICOM-CC 17th Triennial conference ;17-19 September 2014, Melbourne, Australia).
- Ketzer, R. (1991) 'A conservation project in Kairouan', in *7th International Congress of Restorers of Graphic Art. IADA, Internationale Arbeitsgemeinschaft der Archiv-, Bibliotheks- und Graphikrestauratoren*, Uppsala, Sweden, pp. 119–127.

- KMP (2020) *Kairouan Manuscript Project - About*. Available at: <https://www.csmc.uni-hamburg.de/kairouan/about.html> (Accessed: 20 August 2024).
- Knowles, M.S. (1970) *The modern practice of adult education: andragogy versus pedagogy*. New York: Association Press.
- Knowles, M.S. (1973) *The adult learner: a neglected species*. Houston [Tex.]: Gulf Pub. Co.
- Knowles, M.S. (1980) *The modern practice of adult education: from pedagogy to andragogy*. Rev. and updated. Englewood Cliffs, NJ: Cambridge Adult Education.
- Koh, N.S., Gottipati, S. and Shankararaman, V. (2018) 'EFFECTIVENESS OF BITE-SIZED LECTURE ON STUDENT LEARNING OUTCOMES', in *Proceedings of the 4th International Conference on Higher Education Advances (HEAd'18). Fourth International Conference on Higher Education Advances*, Universitat Politècnica València. Available at: <https://doi.org/10.4995/HEAD18.2018.8027>.
- Kokko, S. and Kyritsi, A. (2012) 'Cultural Heritage Education for Intercultural Communication', *International Journal of Heritage in the Digital Era*, 1(1_suppl), pp. 165–168. Available at: <https://doi.org/10.1260/2047-4970.1.0.165>.
- Koo, M. and Yang, S.-W. (2025) 'Likert-Type Scale', *Encyclopedia*, 5(1), p. 18. Available at: <https://doi.org/10.3390/encyclopedia5010018>.
- Krathwohl, D.R. (2002) 'A Revision of Bloom's Taxonomy: An Overview', *Theory Into Practice*, 41(4), pp. 212–218. Available at: https://doi.org/10.1207/s15430421tip4104_2.
- Krüger, P.F. (2020) "'Saints and Ascetics" Jaina Miniature Paintings at the Rautenstrauch-Joest Museum', *NEWSLETTER OF THE CENTRE OF JAINA STUDIES*.
- Krupa, A., Klassen, A. and Nägler, C. (2011) 'Lehre und Forschung Institut für Restaurierungs- und Konservierungswissenschaften - CICS Jubelheft 25 Jahre'. Edited by Institut für Restaurierungs- und Konservierungswissenschaften - CICS Fachhochschule Köln Prof. Dr. Robert Fuchs.
- Kuhlmann, A.M. and Sauter, W. (2008) *Innovative Lernsysteme*. Berlin, Heidelberg: Springer Berlin Heidelberg (X.media.press). Available at: <https://doi.org/10.1007/978-3-540-77831-8>.
- Lambert, S., Debulpaep, M. and Nikolic, A. (2017) 'Using blended learning to strengthen capacity in storage reorganization in Canada, Belgium, and Southeast Europe', in J. Bridgland and International Council of Museums (eds) *ICOM-CC: 18th triennial conference, Copenhagen, 4-8 September 2017: linking past and future: preprints*. Paris: International Council of Museums.

- Lemaire, R. and Stovel, H. (1994) 'Das Nara-Dokument zur Echtheit/Authentizität', in. *Nara-Konferenz zur Authentizität bezogen auf die Welterbe-Konvention*, Nara.
- Leone, A. *et al.* (2020) 'An integrated methodology for the documentation and protection of cultural heritage in the MENA region: a case study from Libya and Tunisia', *Libyan Studies*, 51, pp. 141–168. Available at: <https://doi.org/10.1017/lis.2020.11>.
- Levkoff, S. and Sanchez, H. (2003) 'Lessons Learned About Minority Recruitment and Retention From the Centers on Minority Aging and Health Promotion', *The Gerontologist*, 43(1), pp. 18–26. Available at: <https://doi.org/10.1093/geront/43.1.18>.
- Lewincamp, S. and Sloggett, R. (2016) 'Connecting objects, communities and cultural knowledge', *AICCM Bulletin*, 37(1), pp. 3–13. Available at: <https://doi.org/10.1080/10344233.2016.1206288>.
- Li, R. *et al.* (eds) (2021) *Blended Learning: Re-thinking and Re-defining the Learning Process: 14th International Conference, ICBL 2021, Nagoya, Japan, August 10–13, 2021, proceedings. International Conference on Blended Learning*, Cham: Springer (Lecture Notes in Computer Science, 12830).
- Liamputtong, P. (ed.) (2008) *Doing Cross-Cultural Research*. Dordrecht: Springer Netherlands (Social Indicators Research Series). Available at: <https://doi.org/10.1007/978-1-4020-8567-3>.
- Liamputtong, P. (2010) *Performing qualitative cross-cultural research*. New York: Cambridge University Press.
- Liamputtong, P. (2020) *Qualitative research methods*. Fifth edition. Australia: Oxford University Press.
- Liu, Y. (2023) 'Artwork, budget, sustainability and attractiveness: A board game designed for preventive conservation in museums', in. *ICOM CC 20th Triennial Conference*.
- Loimeier, R. (2022) *Tunesien: Die Entwicklung einer arabischen Zivilgesellschaft*. Göttingen: Göttingen University Press (Göttingen Series in Social and Cultural Anthropology). Available at: <https://doi.org/10.17875/gup2022-1911>.
- Lübcke, M., Müller Werder, C. and Johner, R. (2015) 'Was ist gute Hochschullehre? Befunde aus der Hattie-Studie'. Available at: <https://doi.org/10.21256/ZHAW-1038>.
- Ly, A. (2013) 'A critical discussion of Hofstede's concept of Power Distance', 28, pp. 51–66.
- MacLaren, D. and Börngen, M. (2023) 'Introduction to the Kairouan Manuscript Project at the Centre for the Study of Manuscript Cultures, Universität Hamburg', in A.R. Pataki-Hundt (ed.) *Graphic Documents Working Group Newsletter 4 2023. ICOM-CC Graphic Documents Interim Meeting Postprints Part 2*.

- Mansell, W. (2008) *Research reveals teaching's Holy Grail* | *Tes Magazine*. Available at: <https://www.tes.com/magazine/archive/research-reveals-teachings-holy-grail> (Accessed: 1 February 2023).
- Marçais, G. and Poinssot, L. (1948) 'Objets kairouanais. IXe au XIIIe siècle. Reliures, verreries, cuivres et bronzes, bijoux'.
- Martin, J.N. and Nakayama, T.K. (2022) *Experiencing intercultural communication: an introduction*. Seventh edition. New York, NY: McGraw Hill.
- Max-Neef, M.A. (2005) 'Foundations of transdisciplinarity', *Ecological Economics*, 53(1), pp. 5–16. Available at: <https://doi.org/10.1016/j.ecolecon.2005.01.014>.
- Mazlan, C.A.N. *et al.* (2023) 'Exploring the integration of bite-sized learning: A scoping review of research in education and related disciplines', *Contemporary Educational Technology*, 15(4), p. ep468. Available at: <https://doi.org/10.30935/cedtech/13622>.
- McWilliam, E.L. (2007) 'Is Creativity Teachable? Conceptualising the Creativity/Pedagogy Relationship in Higher Education.', in G. Crisp and M. Hicks (eds) *Proceedings of the 30th HERDSA Annual Conference: Enhancing Higher Education, Theory and Scholarship*. Adelaide, pp. 1–8. Available at: <https://eprints.qut.edu.au/15508/1/15508.pdf> (Accessed: 11 April 2024).
- Meyer, E. (2024) *Die Culture map: verstehen, wie Menschen verschiedener Kulturen denken, führen und etwas erreichen*. 2., aktualisierte Auflage. Weinheim: Wiley-VCH GmbH.
- Ministry for Cultural Heritage and Activities (2024) *NH - Project overview*. Available at: http://www.netheritage.eu/project_overview.html (Accessed: 29 December 2024).
- Mortara, M. *et al.* (2014) 'Learning cultural heritage by serious games', *Journal of Cultural Heritage*, 15(3), pp. 318–325. Available at: <https://doi.org/10.1016/j.culher.2013.04.004>.
- Mulholland, R. (2023) 'Culture, Education and Conflict: The Relevance of Critical Conservation Pedagogies for Post-conflict Afghanistan', *Studies in Conservation*, 68(3), pp. 283–297. Available at: <https://doi.org/10.1080/00393630.2022.2025706>.
- Muñoz Viñas, S. (2020) *On the ethics of cultural heritage conservation*. London: Archetype Publications.
- Narrea, L.E.J.A.C. and Vieira, A.C.D. (2021) 'Crossing Borders: Building conservation capacity through collaboration among Latin-American professionals', in ICOM CC (ed.) *Transcending Boundaries: Integrated Approaches to Conservation. ICOM-CC 19th Triennial Conference Preprints, Beijing, 17–21 May 2021*.

- Neuliep, J.W. (2021) *Intercultural communication: a contextual approach*. Eighth edition, international student edition. Los Angeles London New Delhi Singapore Washington, DC Melbourne: SAGE.
- Nitsche, M. (2020) *Erklärvideos: Aus der Praxis. Für die Praxis*. 1. Auflage. Hamburg: tredition GmbH.
- Nunes Penna, K. (2018) *A critical autoethnographic study of context-related influences on cultural heritage preservation education of World Heritage sites in Northeastern Brazil*.
- Nyayu, S.Y., Heru, S. and Masagus, S. (2019) 'THE USE OF TECHNOLOGY INTEGRATION SAMR MODEL IN TEACHING ENGLISH', *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, 7(1). Available at: <https://doi.org/10.24256/ideas.v7i1.720>.
- Odegaard, N. et al. (2014) 'Professional Education for Afghan Cultural Heritage Faculty', in *Building strong culture through conservation: Preprints ICOM-CC 17th Triennial conference ;17-19 September 2014, Melbourne, Australia. ICOM-CC Triennial conference*, Paris: International Council of Museums.
- Odiaua, I. (2022) 'Heritage Conservation in West Africa', in Odiaua, I., *Oxford Research Encyclopedia of Anthropology*. Oxford University Press. Available at: <https://doi.org/10.1093/acrefore/9780190854584.013.288>.
- OECD (2024) 'DAC list of ODA Recipients'. Available at: <https://www.oecd.org/en/topics/sub-issues/oda-eligibility-and-conditions/dac-list-of-oda-recipients.html> (Accessed: 20 August 2024).
- Orsini, M., Cantrill-Lankester, A. and Merrett, H. (2017) 'Reconciling the past, building the future: A conservation-training project in Kosovo', in *ICOM Committee for Conservation 18th Triennial Meeting Copenhagen Denmark 4-8 September 2017*.
- Orwin, R.G. (1983) 'A Fail-Safe N for Effect Size in Meta-Analysis', *Journal of Educational Statistics*, 8(2), p. 157. Available at: <https://doi.org/10.2307/1164923>.
- Ouariach, S., Ouariach, F.Z. and Khaldi, M. (2024) 'From Lecture Theaters to Online Classrooms: Examining The Growth of the Flipped Classroom', *COMPETITIVE: Journal of Education*, 3(2), pp. 86–101. Available at: <https://doi.org/10.58355/competitive.v3i2.97>.

- Pataki-Hundt, A. (2019) 'Teaching Book and Paper Conservation at the TH Köln – University of Applied Sciences, Cologne', *Restaurator. International Journal for the Preservation of Library and Archival Material*, 40(3–4), pp. 271–286. Available at: <https://doi.org/10.1515/res-2019-0005>.
- Pataki-Hundt, A. and Börngen, M. (2024) 'Mix it! Shake it! Taste it! – Humorvolle und inspirierende Prüfungsformen mit Studierenden entwickeln', in B. Szczyrba, T. van Treeck, and S. Heuchemer (eds) *Neues Handbuch Hochschullehre Sonderausgabe zur TURN23*. Köln.
- Pedersoli Jr., J.L. (2020) *Teaching heritage conservation amid Covid-19*. ICCROM - Athabasca University - IIC. Available at: https://www.iccrom.org/sites/default/files/Heritage%20Conservation%20Teaching%20survey_ICCROM-AU-IIC%20webinar_JLP_170920.pdf.
- Penna, K., Campelo, S. and Taylor, E. (2013) *The challenge of cultural heritage shared management in developing countries*. Available at: <https://doi.org/10.13140/2.1.1414.8162>.
- Penna, K., Tinoco, J.E.L. and Taylor, E. (2015) 'New teaching and learning approaches to cultural entrepreneurship for heritage conservation training programs in Brazil'. Available at: <https://doi.org/10.13140/RG.2.1.3390.0642>.
- Petko, D. (2014) *Einführung in die Mediendidaktik: Lehren und Lernen mit digitalen Medien*. Weinheim Basel: Beltz (Reihe 'BildungsWissen Lehramt', 25).
- Petzet, M. and ICOMOS (eds) (1993) 'Guidlines on Education and Training in the Conservation of Monuments, Ensembles and Sites', in *International charters for conservation and restoration: = Chartes internationales sur la conservation et la restauration = Cartas Internacionales sobre la conservacion y la restauracion*. 2. ed. Paris: ICOMOS (Monuments and sites, 1). Available at: <https://doi.org/10.11588/monstites.2004.0.21799>.
- Piqué, F. *et al.* (2024) 'From theory to practice: towards integration between theoretical scientific teaching and conservation practice', in G. Di Pietro and N. Broers (eds) *Education and Pedagogy. CONSERVATION 360°, (3)*. edUPV. Available at: <https://doi.org/10.4995/360.2024.670101>.
- Politisches Archiv, BAV 250-TUNI/35853 (1983) *Kulturhilfeprojekt Kairouan zur Erhaltung islamischer Manuskripte*. BAV 250-TUNI/35853, Aktenzeichen 600.56.
- Porsmo Stoveland, L. *et al.* (2021) 'Mock-ups and materiality on conservation research', *ICOM Committee for Conservation 19th Triennial Meeting Beijing* [Preprint].

- Präsidium TH Köln (2018) ‘Hochschulentwicklungsplan 2030’. Edited by Der Präsident der TH Köln Prof. Dr. Stefan Herzig.
- Puentedura, R. (2014) *SAMR and Bloom’s Taxonomy: Assembling the Puzzle | Common Sense Education*. Available at: <https://www.commonsense.org/education/articles/samr-and-blooms-taxonomy-assembling-the-puzzle> (Accessed: 30 December 2024).
- al-Rammāh, M. (1996) ‘The ancient library of Kairouan and its methods of conservation’, in *The Conservation and Preservation of Islamic Manuscripts PROCEEDINGS OF THE THIRD CONFERENCE OF AL-FURQĀN ISLAMIC HERITAGE FOUNDATION, 18TH-19TH NOVEMBER 1995 - ENGLISH VERSION. The Conservation and Preservation of Islamic Manuscripts*, Al-Furqān Islamic Heritage Foundation, pp. 29–47. Available at: <https://doi.org/10.56656/100121.04>.
- Reis, T.T. *et al.* (2021) “‘Old Goa Revelations’: A collaborative project for the shared heritage of India and Portugal’, in *Transcending Boundaries: Integrated Approaches to Conservation. ICOM-CC 19th Triennial Conference Preprints, Beijing, 17–21 May 2021*. Beijing.
- remoistenable tissue* (2025). Available at: <https://www.youtube.com/watch?v=h0B-p2ApntI>.
- Rennie, F., Smyth, K. and Mason, R. (2020) *Digital learning: the key concepts*. Second edition. London New York: Routledge, Taylor & Francis Group.
- Russell, H. and Leverton, P. (2014) ‘Delivering a Changing Conservation Curriculum by Distance Learning in the Twenty-First Century’, in J.C. Wells and B. Stiefel (eds) *Preservation education: sharing best practices and finding common ground*. Hanover: University Press of New England, pp. 145–156.
- S. Falser, M., Lipp, W. and Tomaszewski, A. (eds) (2010) *Conservation and preservation : interactions between theory and practice : in memoriam Alois Riegl (1858-1905) : proceedings of the international conference of the ICOMOS International scientific committee for the theory and the philosophy of conservation*. Firenze: Polistampa.
- Salmon, A. (2007) ‘Walking the Talk: How Participatory Interview Methods Can Democratize Research’, *Qualitative Health Research*, 17(7), pp. 982–993. Available at: <https://doi.org/10.1177/1049732307305250>.
- SAS Horus Heritage Services (2020) ‘Horus Condition Report’. Available at: <https://horus-conditionreport.com/en/legal-notice/>.

- Sauerland, S. and Seiler, C.M. (2005) 'Role of Systematic Reviews and Meta-analysis in Evidence-based Medicine', *World Journal of Surgery*, 29(5), pp. 582–587. Available at: <https://doi.org/10.1007/s00268-005-7917-7>.
- Schacht, J. (1967) 'On Some Manuscripts in the Libraries of Kairouan and Tunis', *Arabica*, 14(3), pp. 225–258. Available at: <https://doi.org/10.1163/157005867X00353>.
- Schönpflug, W. (2016) *Psychologie - historisch betrachtet*. Wiesbaden: Springer Fachmedien Wiesbaden (essentials). Available at: <https://doi.org/10.1007/978-3-658-11472-5>.
- Schwartz, W. (1986) *Die Bibliothek der grossen Moschee von al-Qayrawān, Tunesien. Vorarbeiten zu ihrer Geschichte*, unpublished thesis, Fachhochschule für Bibliotheks- und Dokumentationswesen.
- Schwartz, W. (1992) 'Die Handschriften der Großen Moschee in Kairouan', in H. Kammerer-Grothaus (ed.) *Tunesien: Wasser, Wüste, weiter Süden: Ausstellung Übersee-Museum Bremen 6.9.-8.11.1992*. Bremen: Übersee-Museum, pp. 149–154.
- Scott, M. (2014) 'Defining the discipline of cultural materials conservation: professional and pedagogical opportunities', in *ICOM Committee for Conservation 17th Triennial Meeting*. Melbourne Australia.
- Setiyawati, S., Basori, B. and Efendi, A. (2023) 'Substitution, Augmentation, Modification and Redefinition (SAMR) Model to Improve Student's Critical Thinking Ability', *IJIE (Indonesian Journal of Informatics Education)*, 7(1), p. 8. Available at: <https://doi.org/10.20961/ijie.v7i1.60356>.
- Shabbūḥ, I. (1956) 'Sijill qadīm li-maktabat jāmi' al-Qayrawān.', *Revue de l'Institut des Manuscrits Arabes*, 2, pp. 339–372.
- Siemens, G. (2004) 'Connectivism: A Learning Theory for the Digital Age.', *International Journal of Instructional Technology & Distance Learning*.
- Sinha, N. (2008) *Conservation and training in India*. New Delhi: Allied Publ (ICOM Committee for Conservation 15th Triennial Meeting).
- Skinner, B.F. (1938) *The behavior of organisms: an experimental analysis*. Acton, Massachusetts: Copley Publishing Group.
- Skulmowski, A. (2024) 'Learning by Doing or Doing Without Learning? The Potentials and Challenges of Activity-Based Learning', *Educational Psychology Review*, 36(1), p. 28. Available at: <https://doi.org/10.1007/s10648-024-09869-y>.

- Sloggett, R. (2014) 'Harvesting Traditional Knowledge: The Conservation of Indigenous Australian Bark Painting', in *Building strong culture through conservation: Preprints ICOM-CC 17th Triennial conference ;17-19 September 2014, Melbourne, Australia. ICOM-CC Triennial conference*, Paris: International Council of Museums.
- Solstad, J., Ford, T. and Bacon, A. (2008) *Art conservation: an element in nation building?* New Delhi: Allied Publ (ICOM Committee for Conservation).
- Stiftung Innovation in der Hochschullehre (2022) 'Ausschreibung: Freiraum 2022'.
- Stoner, J.H. (2010) 'Connecting to the World's Collections: Making the Case for the Conservation and Preservation of Our Cultural Heritage: Session 466, October 28–November 1, 2009', *International Journal of Cultural Property*, 17(4), pp. 653–654. Available at: <https://doi.org/10.1017/S0940739110000378>.
- Szücs, E. *et al.* (2012) 'Animal Welfare in Different Human Cultures, Traditions and Religious Faiths', *Asian-Australasian Journal of Animal Sciences*, 25(11), pp. 1499–1506. Available at: <https://doi.org/10.5713/ajas.2012.r.02>.
- Tandel, B. (2024) 'Importance and Challenges of Open Educational Resources (OERs)', *International Journal of Progressive Research in Engineering Management and Science*, 4, pp. 1082–1085. Available at: <https://doi.org/10.58257/IJPREMS34951>.
- Tandon, A. *et al.* (2014) 'Culture Cannot Wait: International and National Courses on First Aid to Cultural Heritage in Times of Conflict', in *Building strong culture through conservation: Preprints ICOM-CC 17th Triennial conference ;17-19 September 2014, Melbourne, Australia. ICOM-CC Triennial conference*, Paris: International Council of Museums.
- Taningrum, N. *et al.* (2024) 'Improving Critical Thinking Skills Using Animated Videos Based on Problem-Based Learning', *Retos*, 57, pp. 692–696. Available at: <https://doi.org/10.47197/retos.v57.103297>.
- Temple, B. (1997) 'Watch Your Tongue: Issues in Translation and Cross-Cultural Research', *Sociology*, 31(3), pp. 607–618. Available at: <https://doi.org/10.1177/0038038597031003016>.
- Tenberg, R. (2021) *Didaktische Erklärvideos: ein Praxis-Handbuch*. Stuttgart: Franz Steiner Verlag.
- Terhart, E. and Hattie, J. (eds) (2020) *Die Hattie-Studie in der Diskussion: Probleme sichtbar machen*. 3. Auflage. Seelze: Klett, Kallmeyer (Bildung kontrovers).
- TH Köln (2018) 'Lehr- und Lernkultur der TH Köln Strategische Leitlinien zu Lehre und Studium'.

- TH Köln (2020a) ‘Digitalisierungsstrategie für Lehre und Studium 2025’.
- TH Köln (2020b) ‘Lehre in Zeiten von Corona - Digitalisierung im Rekordtempo und wie Lehrende die “neue” Lehre erleben’. Available at: https://www.th-koeln.de/mam/downloads/deutsch/hochschule/aktuell/presse/insideout_2020_fruhsommer_web.pdf (Accessed: 27 September 2024).
- TH Köln, C.-C.I. of C.S. (ed.) (2016) ‘30 Jahre Restaurierungs- und Konservierungswissenschaft’.
- The Document of Vienna (1998) *European conference ‘A framework of competence of conservator-restorers in Europe’*. Available at: <http://www.encore-edu.org/vienna.htm>.
- The Institute of Conservation (2020) ‘Icon Professional Standards and Judgement & Ethics’.
- Thu, N.T.A. (2024) ‘Intercultural Communication Competence’, *East African Scholars Journal of Education, Humanities and Literature*, 7(06), pp. 190–194. Available at: <https://doi.org/10.36349/easjehl.2024.v07i06.002>.
- Tomaszewski, A. (2002) ‘Towards a pluralistic philosophy of conservation’, in *Estrategias relativas al patrimonio cultural mundial. La salvaguarda en un mundo globalizado. Principios, practicas y perspectivas. 13th ICOMOS General Assembly and Scientific Symposium. Actas. Comité Nacional Español del ICOMOS*, Madrid, pp. 212–215.
- Trompenaars, F. and Hampden-Turner, C. (2020) *Riding the waves of culture: understanding diversity in global business*. Fourth edition. London: Nicholas Brealey Publishing.
- Türkay, S. (2016) ‘The effects of whiteboard animations on retention and subjective experiences when learning advanced physics topics’, *Computers & Education*, 98, pp. 102–114. Available at: <https://doi.org/10.1016/j.compedu.2016.03.004>.
- UNESCO World Heritage (no date a) *Capacity Building, UNESCO World Heritage Centre*. Available at: <https://whc.unesco.org/en/capacity-building/> (Accessed: 24 October 2024).
- UNESCO World Heritage (no date b) *Kairouan, UNESCO World Heritage Centre*. Available at: <https://whc.unesco.org/en/list/499/> (Accessed: 10 September 2024).
- Universität für angewandte Kunst Wien (2024) *Neuer Master-Studiengang „Cultural Heritage Conservation and Management“ in Wien und Bangkok, Restauero*. Available at: <https://dieangewandte.at/chcm?> (Accessed: 19 January 2024).
- University of Toronto Libraries (no date) ‘Hidden Stories - Overview Kairouan’. Available at: <https://hiddenstories.library.utoronto.ca/exhibits/show/kairouan/overview>.

Verger, I. *et al.* (2002) 'Generation 2, a project to assure quality and continuity of training for museum professionals in Africa', in *13th triennial meeting, Rio de Janeiro, 22 - 27 September 2002 / ICOM Committee for Conservation: preprints*. London: James & James.

Visible Learning - Collaborative learning Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/collaborative_learning
(Accessed: 25 July 2024).

Visible Learning - Feedback Details (no date). Available at:
<https://www.visiblelearningmetax.com/influences/view/feedback> (Accessed: 16 May 2023).

Visible Learning - Flipped Classroom Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/flipped_classrooms
(Accessed: 17 May 2023).

Visible Learning - Mentoring Details (no date). Available at:
<https://www.visiblelearningmetax.com/influences/view/mentoring> (Accessed: 17 May 2023).

Visible Learning - Meta-cognition strategies Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/meta-cognition_strategies
(Accessed: 17 May 2023).

Visible Learning - Problem-based learning Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/problem-based_learning
(Accessed: 17 May 2023).

Visible Learning - Self-efficacy Details (no date). Available at:
<https://www.visiblelearningmetax.com/influences/view/self-efficacy> (Accessed: 25 July 2024).

Visible Learning - Self-regulation strategies Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/self-regulation_strategies
(Accessed: 17 May 2023).

Visible Learning - Self-reported grades Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/self-reported_grades
(Accessed: 17 May 2023).

Visible Learning - Teacher Credibility Details (no date). Available at:
https://www.visiblelearningmetax.com/influences/view/teacher_credibility (Accessed: 17 May 2023).

- Visible Learning - Teacher-student relationships Details* (no date). Available at: https://www.visiblelearningmetax.com/influences/view/teacher-student_relationships (Accessed: 25 July 2024).
- Vogel, D.R., Dickson, W. and Lehman, J.A. (1986) 'Persuasion and the Role of Visual Presentation Support : The UM / 3 M Study', in. Available at: <https://api.semanticscholar.org/CorpusID:17332316>.
- Wang, L. (2024) 'A Systematic Literature Review Of The Effective Of Problem-Based Learning In Blended Learning Environment', *Educational Administration: Theory and Practice*, pp. 9877–9892. Available at: <https://doi.org/10.53555/kuey.v30i5.1183>.
- Watson, J.B. (1913) 'Psychology as the behaviorist views it.', *Psychological Review*, 20(2), pp. 158–177. Available at: <https://doi.org/10.1037/h0074428>.
- Wells, J.C. and Stiefel, B. (eds) (2014) *Preservation education: sharing best practices and finding common ground*. Hanover: University Press of New England.
- Wickens, J.D.J. and Gupta, A. (2022) 'Leadership: the Act of Making Way for Others', *Studies in Conservation*, 67(sup1), pp. 319–325. Available at: <https://doi.org/10.1080/00393630.2022.2065956>.
- Winter, T. (2014) 'Beyond Eurocentrism? Heritage conservation and the politics of difference', *International Journal of Heritage Studies*, 20(2), pp. 123–137. Available at: <https://doi.org/10.1080/13527258.2012.736403>.
- Wittich, M. (2020) 'Restauratorischer und konservatorischer Umgang mit Jaina-Miniaturen Abnahme von Klebebändern und mechanische Stabilisierung in kupferfraßgeschädigten Bereichen'. Available at: https://www.th-koeln.de/mam/downloads/deutsch/hochschule/fakultaeten/kulturwissenschaften/f02_cics_sp_sgb_2021_01_poster.pdf (Accessed: 6 August 2024).
- Wolf, K.D. (2015) 'Video-Tutorials und Erklärvideos als Gegenstand, Methode und Ziel der Medien- und Filmbildung', *Filmbildung im Wandel*. Edited by A. Hartung et al., pp. 121–131.
- Zentrum für Lehrentwicklung (no date) *Lehrpfade - neue Wege zur guten Lehre*. Available at: <https://lehrpfade.th-koeln.de> (Accessed: 27 September 2024).
- Zierer, K. (2014) *Kernbotschaften aus John Hatties 'Visible Learning'*. Sankt Augustin: Konrad-Adenauer-Stiftung (Eine Veröffentlichung der Konrad-Adenauer-Stiftung e.V).
- Zierer, K. (2020) 'Zur Weiterentwicklung und Aktualität der Forschungen von John Hattie'.

Appendix

A Abstract and Zusammenfassung	204
<i>Abstract.....</i>	<i>204</i>
<i>Zusammenfassung.....</i>	<i>206</i>
B List cultural heritage conservation training programmes globally, all disciplines....	208
C Surveys	209
<i>C 1 Initial survey among the conservation students.</i>	<i>209</i>
<i>C 2 Analysis of student learning experience, summer semester 2024, winter semester 2024/2025.</i>	<i>215</i>
D YouTube Metrics.....	221
<i>D1 Overall views of the video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.</i>	<i>221</i>
<i>D2 Overall views of the German video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.....</i>	<i>222</i>
<i>D3 Overall views of the English video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.....</i>	<i>223</i>
<i>D4 Video sorted by number of views by country.</i>	<i>224</i>
<i>D5 Number of views and playback time in hours per traffic source.</i>	<i>225</i>

A Abstract and Zusammenfassung

Abstract

This dissertation investigates the dynamics of conservation education through a comparative study of two institutions: the Cologne Institute of Conservation Sciences (CICS) at the University of Applied Sciences Cologne (TH Köln) as an example of an established Western university, and the National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) in Tunisia as an institution in an emerging country.

The comparison reveals significant differences in the educational systems. The CICS is characterised by an extensive basic theoretical training, which sometimes overshadows the practical part of the training on conservation objects. Conversely, the NLPCPM, supported by the Kairouan Manuscript Project (KMP) of the University of Hamburg, focus more on practical training, which often lacks a solid theoretical underpinning. Three key factors emerged as crucial for sustainable education in emerging countries: building trust through long-term commitment, cultural adaptation of Western teaching methods, and native-language materials, especially in video format.

The analysis of digital resources and new media integration using Bloom's Digital Taxonomy and the Substitution, Augmentation, Modification and Redefinition (SAMR) model shows clear institutional differences. At CICS, digital tools enhance didactic competencies across all taxonomic levels: supporting basic knowledge acquisition (remembering), facilitating digital documentation exercises (understanding and applying), enabling analytical comparison of conservation approaches (analysing and evaluating), and empowering students to create their own instructional materials such as video tutorials (creating). In contrast, the NLPCPM operates primarily at the basic levels, remembering and understanding, using video tutorials and simple documentation. The implementation of the SAMR model confirms that CICS has achieved transformative technology integration from substitution to redefinition, while NLPCPM remains at the substitution level due to resource constraints and limited technical expertise. Advanced equipment often remains unused due to insufficient training opportunities.

The research demonstrates the effectiveness of various learning theories in conservation education, particularly cognitive approaches. This includes practical teaching tools such as mock-ups and video tutorials. A key component of the thesis was the development and successful integration of the "Jigsaw Teaching in Conservation-Restoration" project into the flipped classroom methodology at CICS. The integration of video tutorials on conservation

methods into the education of conservators not only led to a deeper understanding of the subject matter, but also increased student confidence. Supplemented by individual mentoring by lecturers during practical sessions, this approach enabled more intensive hands-on work with conservation objects during the second Bachelor semester from the summer semester 2024 (book and leather conservation) and the first Bachelor semester (graphic conservation) from the winter semester 2024/2025.

The course “Managing the Archive, Library and Museum Environment” at the NLPCPM highlighted the importance of theoretical knowledge in conservation. The use of a blended learning format enabled the course to be extended from a few days to ten weeks. Native language video tutorials supported the learning process of the interns in particular. This experience highlighted the need to adapt Western educational methods to local circumstances and cultural values. Cultural sensitivity emerged as crucial, particularly in Tunisia’s high-context communication environment, where Arabic language materials, interpreters, and understanding of local decision-making structures proved essential. This was also made clear during a short-term course on Integrated Pest Management at the NLPCPM.

The study concludes that successful conservation education requires a balance between traditional methods and innovative technologies, while maintaining cultural sensitivity. This applies to both Western institutions and those in emerging countries, where there are opportunities for mutual learning, particularly in conservation methodology. While CICS could learn from a more practical approach to conservation, NLPCPM could benefit from a more western structured theoretical framework and digital integration. Bilateral training programmes and alternative teaching methods are advocated, particularly in regions with limited access to formal conservation training.

Zusammenfassung

Diese Dissertation untersucht die Dynamik der Ausbildung von Restaurator*innen durch eine vergleichende Studie zweier Institutionen: des Cologne Institute of Conservation Sciences (CICS) an der Technischen Hochschule Köln (TH Köln) als Beispiel einer etablierten westlichen Universität und des National Laboratory for the Preservation and Conservation of Parchment and Manuscripts (NLPCPM) in Tunesien als Institution eines Schwellenlandes. Die vergleichende Studie offenbart signifikante Unterschiede in den Bildungssystemen. Das CICS zeichnet sich durch eine fundierte theoretische Grundlagenausbildung aus, die jedoch gelegentlich die praktischen Aspekte in den Hintergrund rücken lässt. Das NLPCPM hingegen, unterstützt durch das Kairouan Manuscript Project (KMP) der Universität Hamburg, legt seinen Schwerpunkt auf die praktische Ausbildung, wobei die theoretische Fundierung oft zu kurz kommt. Drei Schlüsselfaktoren kristallisierten sich als entscheidend für nachhaltige Bildung in Schwellenländern heraus: Vertrauensbildung durch langfristiges Engagement, kulturelle Anpassung westlicher Lehrmethoden und muttersprachliche Materialien, insbesondere im Videoformat.

In Bezug zur Integration digitaler Ressourcen und neuer Medien mittels der Bloom'schen digitalen Taxonomie und des Substitution, Augmentation, Modification und Redefinition (SAMR)-Modells wurden institutionelle Unterschiede deutlich. Am CICS verbesserten digitale Werkzeuge die Kompetenzen auf allen taxonomischen Ebenen: Sie unterstützen den Erwerb von Grundkenntnissen (Erinnern), erleichtern digitale Dokumentationsübungen (Verstehen und Anwenden), ermöglichen den analytischen Vergleich von Restaurierungsansätzen (Analysieren und Bewerten) und befähigen die Studierenden, ihre eigenen Lehrmaterialien wie Video Tutorials zu erstellen (Erschaffen). Das NLPCPM hingegen operiert vorwiegend auf dem Erinnern und Verstehen Niveau, durch das Schauen von Video Tutorials und einfacher Dokumentation. Die Implementierung des SAMR-Modells bestätigt, dass das CICS eine transformative Technologieintegration erreicht hat, während das NLPCPM aufgrund von Ressourcenbeschränkungen auf der Substitutionsebene verbleibt. Die Dissertation belegt die Effektivität verschiedener Lerntheorien in der Restaurierungsausbildung, insbesondere kognitiver Ansätze. Diese umfassen praktische Lehrmittel wie Musterrestaurierungen an Dummies und Video Tutorials. Ein wesentlicher Bestandteil der Dissertation war die Entwicklung und erfolgreiche Integration des „Jigsaw Teaching in Conservation-Restoration“-Projekts in die „Flipped Classroom“-Methodik am

CICS. Diese innovative Kombination führte nicht nur zu einem tieferen Verständnis des Lehrmaterials, sondern stärkte auch das Selbstvertrauen der Studierenden. Ergänzt durch individuelles Mentoring der Dozierenden während der praktischen Lehreinheiten, ermöglichte dieser Ansatz eine intensivere praktische Arbeit an den Restaurierungsobjekten im zweiten Bachelorsemester im Sommersemester 2024 (Buch- und Lederrestaurierung) und im ersten Bachelorsemester (Grafikrestaurierung) im Wintersemester 2024/2025.

Der am NLPCPM durchgeführte Kurs „Managing the Archive, Library and Museum Environment“ unterstrich die Bedeutung theoretischen Fachwissens in der Konservierung und Restaurierung. Die Implementierung eines Blended-Learning-Formats ermöglichte eine Ausdehnung der Kursdauer von wenigen Tagen auf zehn Wochen. Muttersprachliche Video Tutorials unterstützten dabei besonders die Praktikanten in ihrem Lernprozess.

Die gewonnenen Erkenntnisse dieser Forschungsarbeit verdeutlichte die zwingende Notwendigkeit einer Adaptation westlicher Bildungsmethoden an die lokalen Gegebenheiten und kulturellen Wertesysteme. Die kulturelle Sensibilität kristallisierte sich dabei als fundamentaler Erfolgsfaktor heraus, insbesondere im hochkontextuellen Kommunikationsumfeld Tunesiens. In diesem Zusammenhang erwiesen sich arabischsprachige Materialien, qualifizierte Dolmetscher sowie ein fundiertes Verständnis der lokalen Entscheidungsstrukturen als unabdingbar für eine erfolgreiche Implementation der Bildungsmaßnahmen. Dies wurde auch während eines 5-tägigen Kurses über Integriertes Schädlingsmanagement am NLPCPM deutlich.

Die Studie kommt zu dem Schluss, dass erfolgreiche Restaurierungsausbildung eine Balance zwischen traditionellen Methoden und innovativen Technologien erfordert. Dies gilt für beide Institutionen, wobei gegenseitige Lernmöglichkeiten bestehen: Während das CICS von einem stärker praxisorientierten Ansatz profitieren könnte, würde das NLPCPM von einer strukturierten theoretischen Grundlage und digitalen Integration profitieren. Die Arbeit befürwortet bilaterale Ausbildungsprogramme und alternative Lehrmethoden, besonders in Regionen mit begrenztem Zugang zu formaler Restaurierungsausbildung.

B List cultural heritage conservation training programmes globally, all disciplines

Address	City	State	Zipcode	Name	URL
Bruce ACT	Canberra	Australia	2617	University of Canberra, BA of Cultural Heritage Conservation	https://www.canberra.edu.au/course/ARC102/1/2021
Grattan Street, Parkville	Victoria	Australia	3010	University of Melbourne	https://study.unimelb.edu.au/find/courses/graduate/master-of-cultural-materials-conservation/
NSW 2006	Sydney	Australia	2006	University of Sydney	https://www.sydney.edu.au/architecture/study-architecture-design-planning/study-areas/heritage-conservation.html
72 CAT Telecom Tower, Charoen Krung Rd, Si Phraya, Bang Rak	Bangkok	Thailand	10500	Silpakorn University International College	https://www.suic.su.ac.th/programmes/cultural-heritage-conservation-and-management
National Gallery of Denmark, Solvgade 48-50	Copenhagen	Denmark	1307	Centre for Art Technological Studies and Conservation (CATS)	https://www.snmk.dk/en/section/cats/
Institut for Konservering, Esplanaden 34	Copenhagen	Denmark	1263	The Royal Danish Academy of Fine Arts School of Conservation	https://ifa.nyu.edu/conservation/index.htm
Mylläpuutentie 1	Helsinki	Finland	79	Metropolia University of Applied Sciences	https://www.metropolia.fi/en/academics/degree-programmes-in-finnish/conservation
Niels Henrik Abels vei 36, Blindernveien 11	Oslo	Norway	851	University of Oslo	https://www.hf.uio.no/fakh/english/
Universitetsplatsen 1	Gothenburg	Sweden	405 30	University of Gothenburg	https://www.gu.se/en/conservation
1300 Elmwood Ave., Rockwell Hall 230	Buffalo	NY	14222	Buffalo State, The State University of New York	https://artsconservation.buffalostate.edu/
1172 Amsterdam Avenue	New York	NY	10027	Columbia University	https://www.arch.columbia.edu/programs/7-m-s-historic-preservation
Harvard Art Museums, 32 Quincy Street	Cambridge	MA	2138	Harvard University	https://harvardartsmuseum.org/teaching-and-research/research-centers/traus-center-for-conservation-and-technical-s
The Stephen Chan House, 14 East 78th Street	New York	NY	10075	Institute of Fine Art, The Conservation Center	https://ifa.nyu.edu/conservation/index.htm
Art Centre Extension, 15 Bader Lane	Kingston	Canada	K7L3N6	Queen's University, Department of Art History&Art Conservation	https://www.queensu.ca/art-art-conservation
308 Charles E. Young Dr. North	Los Angeles	CA	90095	University of California, Getty Conservation Program	https://conservation.ucla.edu/
210 South College Ave.	Waterthor	DE	19716	University of Delaware,Department of Art conservation	https://www.artcons.udel.edu/
210 South 34th Street	Philadelphia	PA	19104	Weitzman School of Design, University of Pennsylvania	https://www.design.upenn.edu/historic-preservation/work
1 Dundas St. West	Toronto	Canada	M5B2K3	Ryerson University	https://www.ryerson.ca/graduate/programs/film-photography-preservation/
125 West Washington St.	Iowa City	IA	52242-14	The University of Iowa, Libraries	https://www.lib.uiowa.edu/preservation/
General Anaya 187, Col. San Diego Churubusco	Burlington	VT	5405	The University of Vermont, College of Arts and Sciences	https://www.uvm.edu/cas/historicpreservation
Auguste 2-6	Coyoacan	Mexico	4120	Escuela Nacional de conservación, restauración y museografía	https://www.encreym.mx/principal/index.php
Oskar-Kokoschka-Platz 2	Vienna	Austria	1090	Akademie der Bildenden Künste Wien	https://www.akbild.ac.at/Portal/studium/studienrichtungen/konservierung-und-restaurierung
Boulevard de la Constitution 41	Vienna	Austria	1010	Die Angewandte, University of Applied Arts Vienna	https://www.dicangewandte.at/
Prinsstraat 13	Lige	Belgium	4020	Saint-Luc Lige, école supérieure des arts	https://www.saint-luc.be/cursus/conservation-restauration-des-oeuvres-dart/
599 Beale St.	Antwerpen	Belgium	2000	University of Antwerp	https://www.uantwerpen.be/en/study/programmes/all-programmes/ba-conservation-restoration/study-programme/
14487 Niagara Parkway	Peterborough	Canada	K9J7B1	Flaming College, Cultural Heritage Conservation and Management	https://www.flamingcollege.ca/programs/cultural-heritage-conservation-and-management
W 7th Rd., Xincheng District	Queenston	Canada	L0S1L0	Willowbank	http://willowbank.ca/
Zagrebacka 3	Xian	China		ICOMOS International Conservation Center-Xi'an	http://www.iioc.org.cn/
Trg Republike Hrvatske 14	Split	Croatia	21000	Art Academy in Split	http://www.umass.unist.hr/en/departments/fine-arts/conservation-restoration/
Braničeva Dubrovnička 29	Zagreb	Croatia	10000	University of Zagreb (wird nicht mehr angeboten?)	http://www.unizg.hr/homepage/study-at-the-university-of-zagreb/degrees-studies-and-courses/studies-and-courses-i
Francuska 101	Dubrovnik	Croatia	20000	University of Dubrovnik	http://web.unidub.hr/odjel.php?diubornik=636
Karlova 111	Brno	Czech Republic	60200	Higher Professional School Brno	https://www.asudbrno.cz/en/bp-school-departments/conservation-and-restoration-of-furniture-and-non-polychromed
Studentská 95	Pardubice	Czech Republic	532 10	University of Pardubice, Faculty of Restoration	https://www.ar.unipr.cz/kk/sarceite/
Technická 5	Prague	Czech Republic	166 28	UCT Prague, Faculty of Chemical Technology	https://fr.ft.upce.cz/en
U Akademie 172/4	Prague	Czech Republic	17000	Academy of Fine Arts Prague	https://fcht.vsch.t.cz/?jazyk=en
58 Boulevard Garibaldi	Paris	France	75015	School Condé Patrimoine	https://www.avu.cz/eng
500 Chemin de Baigues Pieds	Avignon	France	84000	École supérieure d'art	https://ecoles-conde.com/en/ecole-de-restauration-du-patrimoine/
40, rue du Docteur Chaumier	Tours	France	37000	École supérieure des beaux-arts	http://esavignon.eu/
2 Rue Vivienne	Tours	France	37002	Institut national du patrimoine	https://esad-talm.fr/en/study/conservation-and-restoration-cultural-heritage
12 Place du Panthéon	Paris	France	75231	University Paris 1 Panthéon-Sorbonne	http://www.inp.fr/en/initial-training-and-continuing-education/Department-of-conservators
Treskowallee 8	Berlin	Germany	10318	Hochschule für Technik und Wirtschaft Berlin	https://hicaa.univ-paris1.fr/page.php?r=3&id=971&lang=fr
Uherring 40	Köln	Germany	50678	Cologne Institute of Conservation Sciences (CICS)	https://krg.htw-berlin.de/
Brühlische Terrasse 1	Dresden	Germany	1067	Hochschule für Bildende Künste Dresden	https://www.th-koeln.de/kulturwissenschaften/institut-fuer-restaurierungs-und-konservierungswissenschaft_10217
Altonaer Str. 25	Erfurt	Germany	99085	Fachhochschule Erfurt	https://www.hfbk-dresden.de/lehre-forschung/studiengaenge/restaurierung/
Holmsen 4	Hildesheim	Germany	31134	HAWK University of Applied Sciences and Arts	https://www.th-erfurt.de/
Oettingenstr. 15	München	Germany	80538	Technische Universität München	https://www.hawk.de/en/studies/courses-of-study/bsc-conservation-and-restoration-hildesheim
Gieselerstraße 7	München	Germany	80802	Görring Institut	https://www.ar.unidub.hr/odjel.php?diubornik=636
Kiepenheuerallee 5	Potsdam	Germany	14469	Fachhochschule Potsdam	https://goerringinstitut.de/
Am Weißenhof 1	Stuttgart	Germany	70191	Statistische Akademie der Bildenden Künste Stuttgart	https://www.th-potsdam.de/studieren/bewerbenstudienbewerbung/bachelorstudiengaenge/konservierung-und-restaurierung/
Ag. Spiridonos street	Athens	Greece	12210	Technological Educational Institute of Athens	https://www.abk-stuttgart.de/en/studies/study-programmes/papierrestaurierung.html
65, N. Plafira str.	Thessaloniki	Greece	54250	University of Thessaloniki, Management	http://www.teiath.gr/sigkis/sact/articles.php?id=12643&lang=en
Ila Miniat 17	Argosoli	Greece	28100	TEI Ionian Nison Technological Educational Institute of Ionian Is	http://www.acath.gr/index.php/en/contact-us-en
Central Ave	HongKong	China		The Chinese University of Hong Kong	http://www.teion.gr/
Pok Fu Lam	HongKong	China		The University of Hong Kong, faculty of architecture	http://www.arch.cuhk.edu.hk/research/design-research-units/hood/
18-A, Satsang Vihar Marg	New Delhi	India	110067	Delhi Institute of Heritage Research and Management	https://www.arch.hku.hk/programmes/conservation/bachelor-of-farts-in-conservation/
Sector G	Lucknow	India	226021	National Research Laboratory for Conservation of Cultural Property	http://www.dihrm.delhigovt.nic.in/
Survey No 44/1, Sinhgad Road	Pune	India	411041	Sinhgad College of Architecture	http://www.nrlc.gov.in/
56, Sakhuai St., Hafez ave.	Tehran	Iran	1,1E+09	Art University of Tehran	http://cms.sinhgad.edu/architecture-scoa/march_arch_conservation/coursestructure.aspx
Ghal-e-Tabarak, Ostendari Street	Isfahan	Iran		Art University of Isfahan	https://art.ac.ir/en/page/919/faculty-of-conservation-and-restoration
Pajooesh Sq.	Tehran	Iran		Tehran Islamic Art University	https://en.iau.ac.ir/Index.aspx?temppname=ENShow&lang=2&sub=0&codeq=124
Via di S. Michele 25	Kerman	Iran	76169-141	Shahid Bahonar, University of Kerman	https://architecture-en.ubzhzai.ac.ir/?MID=106&title=conservation
Via degli Alfiani 78	Rome	Italy		Istituto Centrale per il Restauro	https://chb.ub.ac.ir/en/home
MSD 2080	Firenze	Italy	50122	Opificio delle Pietre Dure	https://www.iscr.beniculturali.it/pagina.cfm?us=5
Calle Analaco 285	Msidra	Malta	2080	University of Malta	http://www.opificiodellepietredure.it/
Av. Dr.Salvador Nava Martinez 382	Guadalajara	Mexico	44450	Escuela de Conservación y Restauración de Occidente	https://www.um.edu.mt/ben/builtheritage
Spa 21	San Luis Potosi	Mexico	78290	San Luis Potosi, Universidad Autónoma de San Luis Potosi, Facultad de Artes	http://www.ecro.edu.mx/
plac Jana Matejki 13	Netherlands		1012 WX	University of Amsterdam	http://habitat.usap.mx/docentes/contacto-coordinaciones
Krakowskie Przedmiescie 5	Kraków	Poland	31-157	Jan Matejko Academy of Fine Arts	https://www.uva.nl/en/programmes/minors/conservation-and-restoration-of-cultural-heritage/conservation-and-restor
Jurija Gagarina 11	Warszawa	Poland	00-068	Academy of Fine Arts in Warsaw	https://www.asp.krakow.pl/international/facilities-and-programmes/faculty-of-conservation-and-restoration-of-works
Generala Romalda Traugutta 19/21	Torun	Poland	87-100	Nicolas Copernicus University in Torun	https://w.kids.asp.waw.pl/
Humanitarian, Education City	Wroclaw	Poland	50-416	The Eugeniusz Geppert, Academy of Art and Design	https://www.umk.pl/en/university/faculties/
Strada General Constantin Budisteanu 19	Doha	Qatar		University College London, Qatar	https://www.asp.wroc.pl/module-StaticContent&controller=Main&id=134&_seoName=Ceramics+%26+Glass+C
Strada Cuza Voda 29	Bucharest	Romania	10773	National University of Arts	https://www.ucl.ac.uk/global/regional-focus/ucd-qatar-2010-2020
Bulevardul Vasile Parvan 4	Cluj-Napoca	Romania	40098	University of Art and Design	https://uniarie.org/departement/conservare-si-restaurare/
13B Universitetskaya Emb.	Iasi	Romania	70040	National University of Arts George Enescu	https://www.and.ro/ro/programme_studii/licenta/conservare_restaurare/
Carrer d'Aiguablava 109	Timisoara	Romania	300223	West.Universität Tescenwar	https://www.artelias.ro/?page_id=543&id=14263663392&id=28257-ad4e
Rúa Xeneral Martiñeui 1	St.Petersburg	Russia	199034	St.Petersburg State University	https://artc.uvt.ro/educatie/licenta/conservare-restaurare/
Calle de Guillermo Rolland 2	Barcelona	Spain	8033	ESCRBBC Escola Superior de Conservación i Restauració de Béns Culturals	https://english.spbu.ru/85-program-ba/1617-musology-and-conservation-of-cultural-and-natural-heritage-sites
Calle Coso Alto 61	Pontevedra	Spain	36002	Escola Superior de Conservacion e Restauracion de Bens Culturais	https://www.escribe.com/es/
Calle Estibadores 3	Madrid	Spain	28013	Escola Superior de Conservación y Restauración de Bienes Culturais	https://www.escribe.com/es/
Pintor el Greco 2	Huesca	Spain	22003	Escola Superior de Conservación y Restauración de Bienes Culturais	https://escrya.catedu.es/
Camino de Vera	Avilés	Spain	33490	Escola Superior de Arte de Asturias	https://www.esap.org/titulaciones/restauracion/documento-grafico/
Pas Gargallo	Madrid	Spain	28040	Universidad Complutense Madrid	https://bellasartes.ucm.es/estudios/grado-conservacionyrestauraciondepalrimoniocultural
Av. De Casado del Alisal 12	Valencia	Spain	46022	Polytechnic University of Valencia	http://www.upv.es/titulaciones/GCRBC/index-en.html
Av. De Filiberto Villalobos 7	Barcelona	Spain	8028	University of Barcelona	https://www.uh.edu/portal/web/finearts/bachelor-s-degrees/-ensenyament/detallEnsenyament/105546/
Calle de Leopoldo Cano 20	Palencia	Spain	34001	Escuela de Arte y Superior de Palencia	http://esalanamotion.centros.educayjcy.es/sitio/
Plaza Granada 2	Sallamanca	Spain	37007	Escuela de Arte y Superior de Conservación y Restauración de Sal	http://casalamanca.centros.educayjcy.es/sitio/index.cgi?wid_seccion=45&wid_item=112
Gran Via 622	Valladolid	Spain	47003	Escuela de Arte y Superior de Conservación y Restauración de BC	https://eva.es/oferta-educativa/cas-conservacion-restauracion/
Campus Drive	Avila	Spain	5003	Escuela de Arte y Superior de Conservación y Restauración de Bie	http://www.esceuladartevela.es/cy/r-de-bienes-arqueologicos.html
Fellerstrasse 1	Barcelona	Spain	8007	Escuela de Conservación i Restauració d'obres d'art ECOPE	https://www.ecope.es/cursos-restauracion/presenciales/paper-libres
Espace de Europee 11	Twee Rivieren	South Africa	6411	The South African Institute for Heritage Science & Conservation	http://www.sainst.org/
Via Pobetta 11	Bern	Switzerland	3027	Hochschule der Künste Bern	https://www.bhb.bfh.ch/de/studium/bachelor/konservierung/
J-8R6698	Neuchâtel	Switzerland	2000	Haute Ecole Arc Direction	https://www.bh-arc.ch/fr
No. 123B, Section 3, Daxue Road	Manno	Switzerland	6928	Scuola universitaria professionale della Svizzera italiana (SUPSI)	https://www.supsi.ch/dac/bachelor-master/conservazione.html
Universitær, Dumlupinar Bulvarı 1.6-133	Taiwan City	Taiwan	72045	Taiwan National University of the Arts, Graduate Institute of Cons	https://www.mnu.edu.tw/jw412-1000-2968.php?lang=en
Kubioyicha Street 38	Doulin City	Taiwan	64002	YunTech, NYUST National Yunlin University of Science and Te	https://nyustconservation.weebly.com/
Cardiff CF10 3AT	Ankara	Turkey	6800	Middle East Technical University	https://www.metu.edu.tr/
G128QQ	Lviv	Ukraine	79011	Lviv National Academy of Arts	https://lnam.edu.ua/en/faculties/fine-arts-and-restoration.html
124 Kennington Park Road	Cardiff	United Kingdom		Cardiff University	https://www.cardiff.ac.uk/study/postgraduate/taught/courses/course/professional-conservation-misc
Strand	Glasgow	United Kingdom		The Textile Conservation Center, University of Glasgow	https://www.gla.ac.uk/postgraduate/taught/textileconservation/
Mill Ln, Whitesford	London	United Kingdom	SE114DJ	City&Guilds of London Art School	https://www.cityandguildsartschool.ac.uk/ba-hons-conservation-books-paper/
31-34 Gordon Square	London	United Kingdom	WC2B0RQ	Courtauld Institute of Art	https://courtauld.ac.uk/study/postgraduate/conservation-of-easel-paintings/
Sutherland Building	London	United Kingdom	CR2 4NL	Hamilton Kerr Institute	https://www.iki.fitzmuseum.cam.ac.uk/courses/postgraduate/diploma
Bryford Way	London	United Kingdom	WC1H0P	Institute of Archaeology at University College London	https://www.ucl.ac.uk/archaeology/
West Dean	Newcastle	United Kingdom	NE18ST	Northumbria University	https://www.northumbria.ac.uk/study-at-northumbria/postgraduate-study/
12-8 Unkenken	Lincoln	United Kingdom	LN6 7TS	University of Lincoln	https://www.lincoln.ac.uk/home/h/conservation/
1204 Kamoshida-cho, Aoba-ku	Chichester	United Kingdom	PO18QQZ	West Dean Collage	https://www.westdean.org.uk/study/school-of-conservation
	Tokyo	Japan	110-8714	Tokyo University of the Arts	https://www.geidai.ac.jp/english/art/special-graduate-courses
	Yokohama City	Japan	227-0033	Yokohama University of Art & Design	https://www.yokohama-art.ac.jp/en/en/course_conservation.html

C Surveys

C 1 Initial survey among the conservation students.

Original questions in German. Each line reflects the answer of a student.

1. In welchem Semester studieren Sie?
13
4
5
1
3
1. Semester
1. Master
1
Im ersten Semester
3
Erste
4
1

2. Haben Sie bereits ein Studium oder eine Ausbildung absolviert? Wenn ja welches?
Buchbinder im Handwerk/ Einzel- und Sonderanfertigung
Bachelor of Arts, Kunstgeschichte, Geschichte
Ausbildung: Bautechnische Assistentin im Bereich Denkmalpflege
nein
nein
Nein
nein (nur BA Restaurierung SGB)
Buchbinder
Noch keine fertige Ausbildung
Ausbildung zur Orthopädietechnik-Mechanikerin
Kunstgeschichte
Gemälderestaurierung
1 Semester Geschichte und Religionswissenschaften

3. Worin lagen Ihre Schwerpunkte im Vorpraktikum?**Grafik, Buch, Archiv, Ausstellung, Sonstiges?**

Archiv und Pergamenturkunden (mit Wachssiegeln)

Archiv

Buch

Archiv und in geringem Umfang Grafik

Grafik und Buch

Grafik

Archiv, Karten

Buch

Grafik und Buch, durch Zufall mehr Buch

Viel Grafik, Plakate und Urkunden, etwas Archivgut, wenig Buch und 3D-Objekte. Einige Schadenskartierungen und Umverpackungen in Archiven.

Ein bisschen von jedem

Gemälderestaurierung, Ausstellungsaufbau, Grafik

Archiv, Urkunden, Buch, Großformate, Pergament

4. Gibt es bisher Themen im Studium, Vorpraktikum oder Ausbildung, bei denen Sie sich eine visuelle Erklärung (praktische Vorführung, Video oder zumindest Bilder) gewünscht hätten? In den Praxiseinheiten oder auch in den naturwissenschaftlichen Fächern?

Arbeitssicherheit im Labor, Umgang mit und Aufbewahrung und Entsorgung von verschiedenen Chemikalien, Wo findet man Informationen zu am CICS vorhandenen Materialien/ Werkzeugen/ Geräten, Durchführung verschiedener Bleichmethoden, Verwendung der Wasserenthärtungsanlage, Wie sieht eine gute Fotodokumentation aus nach CICS-Standards bzw. wie wird diese angefertigt

Insbesondere bei Buchbinderischen Techniken (bspw. Heftungen, Bindungstypen, Kapital stechen)

Im Leder Semester wäre es praktisch gewesen.

Wenn "im Vorbeigehen" Techniken, (insbesondere buchbinderisch), Schadensbilder oder eine typische Art der Behandlung von Schäden erwähnt werden.

Videos wären insbesondere für die Vertiefung/Erarbeitung von Inhalten zuhause gut geeignet.

RTI Dome (ausführlichere Anleitung als vorhanden, am liebsten praktische Vorführung)

Ich hätte mir eher noch eine wissenschaftliche Erklärung gewünscht, da mir in meinem Praktikum das meiste praktisch vorgeführt wurde.

In den naturwissenschaftlichen Laborpraktika wurde einmal mit Erklärvideos zu Versuchen gearbeitet, was die Versuche Vorort sehr entspannte, da meisten max. 1 Dozent da ist. Wäre regulär bestimmt für beide Seiten eine enorme Entlastung.

Im Vorpraktikum kann selten gewährleistet werden, dass man auf alle Themen (Leder, Grafik, Buch, etc.) vorbereitet wird. Da wären zum Selbstbeibringen oder als Ergänzung Videos sehr nützlich, Bsp. Wie schärfe ich Leder.

Anfasern

Noch nicht

Brainstorming:

Grafik kaschieren - Hab ich zwar mehrmals gemacht, allerdings nicht oft genug, damit ich mich ganz genau erinnern kann.

Kapitale stechen - Ich komme mit dem Jäckel leider nicht wirklich zurecht...
 Evtl. Herstellung eines Holzdeckelbands (wahrscheinlich zu umfangreich)
 Ansetzen diverser Klebstoffe, z.B. Hausenblase
 Kleister kochen mit dem ThermoMix und in der Mikrowelle
 Buchrestaurierung: Wie fixiere ich einen an einer Seite oder ganz gelösten Buchrücken?
 Wie mache in eine Hülse an einem Buch mit echten Bündeln (anformen / einschnitten)?
 Anleitungen für die Mikroskope und andere technischen Geräte.
 Visualisierung der bei Fr. Pataki besprochenen Methoden, wie Leporelloheftung bei
 Neubindung von Pergamentlagen, Joint tacketing, Middleton Methode (oder Hinweis auf
 die entsprechenden Arbeiten, in denen man nachschauen kann)

Bei allen Praxiseinheiten

-

Im Vorpraktikum lief das meist miteinander einher. Im Vorfeld die Erklärung und im
 Anschluss die praktische Durchführung

**5. Gibt es Themen/ Verfahren/Techniken im Studium, Vorpraktikum oder
 Ausbildung, bei denen Sie sich nicht getraut haben nachzufragen, weil Sie das Gefühl
 haben, dass alle anderen das als selbstverständlich wahrnehmen, z.B. Kleister kochen,
 Risse schließen, Leder ausschärfen, Verknoten des Heftfadens?**

Verschiedene Möglichkeiten Weizenstärkekleister oder auch andere Bindemittel/
 Kompressen anzusetzen und anzuwenden, Ausschärfen von Leder bzw. das Schleifen der
 Messer

Ansetzen von Klebstoffen, Handgriffe die gut klappen, "Anatomie" von Büchern

Ja Kleister kochen, meine Chefin hatte den schon immer fertig da.

Eher nein.

Allerdings gibt es Techniken, die ich nicht mehr so gut im Kopf habe und die sich auch
 anhand von Notizen schlecht rekonstruieren lassen.

-

verschiedene Buchbindetechniken, die aus der Literatur nicht ausreichend nachzuvollziehen
 sind (es handelte sich um ein Coronasemester zuhause)

Anfasern

Noch nicht

Verwendung für Materialien, die als Buchbinder selbstverständlich sind (AeroCotton, ...)

-

Prozentrechnung, z.Bsp. wenn Klebstoffe angesetzt werden

6. Von welcher Konservierungs-/Restaurierungstechnik haben Sie gehört, aber dazu keine (ausreichende) Literatur oder Erklärung gefunden? z.B. Posts auf Social Media (Wässern mit Tensiden)

Restaurierung von Fotografien,

Anfasern

-

Zeichenshirting (Schirting)

Bisher noch keine

Viele Methoden werden angesprochen (beim Wässern im Bad, auf dem Saugtisch, auf der schiefen Ebene / beim Bleichen verschiedene Bleichverfahren), allerdings fehlt oft eine Entscheidungshilfe, wann man was anwenden sollte oder könnte, dann bleibt man doch eher bei den Methoden, die man schon einmal durchgeführt hat.

-

7. Welche Probleme/ Fragen treten auf, wenn Sie Fachartikel lesen, z.B. unvollständige Rezeptangaben, ungenaue Beschreibung bei der Durchführung oder sprachliche Hürden bei englischsprachigen Texten?

Manchmal wird Wissen vorausgesetzt welches man selber nicht hat und teilweise ist der Weg, so simpel er scheinen mag, das schwierigste.

Vorraussetzen des gelesenhavens anderer Literatur, wenn nur noch Namen bestimmter Autor:innen erwähnt werden um auf Themen/Techniken hinzuweisen.

unvollständige u. ungenaue Angaben u. Beschreibungen, fehlende/zu wenig Bebilderung

Oft fehlen Zeitangaben oder die Anzahl an Durchgängen einer Maßnahme oder Handlung

Zu hochgestochene Sprache

Oft fehlen bei den Restaurierungsverfahren kleine Zwischenschritte, da die Artikel ja weniger als direkte Anleitungen gedacht sind. Ist mir im letzten Semester öfter bei den BA / MA Arbeiten aufgefallen, die ich für die Buchrestaurierung gelesen habe.

Verhältnisangaben, z.B. 1:3 ist unklar; 1+3 oder 1 von 3?

Spezifische Restaurierungsvokabeln im englischen

8. Haben Sie selber schon Videos zu Restaurierungstechniken gedreht, um sich später besser dran zu erinnern? Wenn ja zu welcher Technik?

Verschiedene Hefttechniken

Keine Videos aber Fotos. Gerade beim systematischen Vorgehen von Restaurierungen wie bei Büchern.

Nein

nein

kompliziertere Kapitalbänder, Bleichen, Behandlung von Bleiweißverschwärzung, Kaschierung eines sehr dünnen Japanpapiers in Wasserpfüte schwimmend

Bisher noch nicht, ist aber eine gut Idee!

zu Hause ja - Bindetechniken, Knoten

Nein

Nein

Ich schreibe mir die Anleitungen und z.T. ganze Restaurierungsmaßnahmen an einem Objekt auf mit zugehörigen Skizzen.

zu Maltechnik

Nein, aber ist eine gute Idee

9. Wie lange können Sie einem Video oder einer Powerpoint wirklich aufmerksam folgen, 5 min, 10 min oder länger?

5-10 min

Dabei kommt es darauf an wie das Video gestaltet ist. Zeitstempel helfen bei längeren Videos um Dinge die nicht von Interesse sind zu überspringen

30 Minuten, danach fange ich an abzuschweifen.

einem Video 10 Minuten, einer Powerpoint, je nach Gestaltung, auch länger, vielleicht 20 min?

10 min, wenn berechtigt auch länger

10min

sehr unterschiedlich je nach Thema und Aufmachung

ca. 10 oder etwas länger, variiert sehr stark je nach Qualität der Präsentation

Ca. 10 Minuten, länger wenn sie gut ist

Ich denke nicht länger 10 - max. 15 min.

Länger

30 min

Ca 30min

10. Welche der folgenden Interessengruppe trifft am besten Ihre ganz persönlichen Kompetenzen: die "praktische RestauratorIn", die "chemische AnalytikerIn", die "RestaurierungstechnikerIn", die "RestaurierungsvermittlerIn" oder die zukünftige "ManagerIn"...

ManagerIn

Projektleitung/ Vermittlung oder praktische Restauratorin

Praktische Restauratorin

praktische Restauratorin, chemische Analytikerin, Restaurierungstechnikerin

praktische Restauratorin

praktische RestauratorIn

praktische Restauratorin

praktische Restauratorin

Die praktische Restauratorin

praktische RestauratorIn

Die praktische Restauratorin

praktische Restauratorin

Praktische Restauratorin

11. Vielen Dank für Ihre Antworten. Falls Sie noch weitere Fragen/Anregungen/Wünsche haben dann ist hier Platz dafür.

Super Idee mit der Umfrage!

TH Köln Deutz stellt inzwischen ein Videoraum für Lehrvideos zur Verfügung

Besprochene Power Points mit eingebetteten Videos und einer anschließenden Besprechung und Diskussion sind für mich sehr angenehm zum lernen. Bei längeren Videos finde ich es sehr hilfreich, wenn man eine kleine timestamp Übersicht o.Ä. hat, da man gerade beim praktischen nacharbeiten öfter zu den relevanten Stellen springen möchte

Ich kann gerne weitere Ideen für Anleitungen sammeln, wenn das weiterhilft. LG

letzte Frage ist die wichtigste

C 2 Analysis of student learning experience, summer semester 2024, winter semester 2024/2025.

Original questions 1-21 in German.

Each line reflects the answer of a student.

1 to 5: representing varying degrees of agreement or disagreement with the statement:

1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree.

1. Ich habe mir stets die empfohlenen Videos vor der Werkstattarbeit angesehen.
5
5
5
5
4
3
5
5

2. Die Video-Tutorials haben meine Motivation für die praktische Arbeit gesteigert.
4
4
5
4
3
4
4
4
4

3. Ich bereite die Inhalte der Werkstattarbeit nach.
3
4
4
4
4
4
5
4

4. Ich kann mir vorstellen die Video-Tutorials auch später noch einmal als Erinnerung heranzuziehen.

5
5
4
5
5
4
5
5

5. Im Vergleich zum vorherigen Semester (Pergament) habe ich in diesem Semester das Gefühl dem Lernstoff besser folgen zu können.

2
4
4
4
3
3

6. Die Video-Tutorials helfen mir den Lernstoff besser zu verstehen.

4
5
4
5
4
4
5
4

7. Ich würde mir weitere Video-Tutorials wünschen.

5
5
5
5
4
4
3
5

8. Ich würde mir auch bei anderen Vorlesungen wünschen, dass diese im Flipped classroom Konzept durchgeführt werden. Dies bedeutet, dass einige theoretische Inhalte im Vorfeld digital zur Verfügung gestellt werden und dann mehr Zeit für praktische Arbeit/Diskussionen ist.

5
5
3
4
2
4
5
4

9. Ich habe das Gefühl mein Lerntempo selbst bestimmen zu können.

4
2
4
5
4
4
5
5

10. Ich kann Lerninhalte zeitlich flexibel erwerben.

2
5
4
5
5
4
4
5

11. Ich habe das Gefühl das die Werkstattarbeit zu viel Zeit in Anspruch nimmt im Vergleich zu den anderen Vorlesungen/Seminaren.

1
3
1
1
1
1
1
1
1

12. Die Video-Tutorials bereiten mich ausreichend auf die Werkstattarbeit vor.

3
3
2
3
3
3
4
4

13. Das zusätzliche Schauen von Video-Tutorials vor der Werkstattzeit ist sehr zeitaufwändig.

2
1
3
1
1
3
1
1

14. Die Video-Tutorials sind verständlich aufgebaut.

5
5
4
5
5
4
4
5

15. Die Video-Tutorials sind mir zu lang.

1
1
2
1
1
3
3
1

16. Die Diskussionen mit den Dozierenden während der Werkstattzeit, helfen mir dabei gewisse Inhalte besser zu verstehen.

5
5
5
5
5
4
4
4

17. Die Video-Tutorials geben der Werkstattarbeit mehr Struktur.

3
5
3
5
3
3
4
4

18. Wie oft schaue ich mir die Video-Tutorials vor der Werkstattzeit an?

2
1
2
2
3
2
1
2

19. Wie oft schaue ich mir die Video-Tutorials als Nachbereitung an?

2
1
1
2
1
2
1
1

20. Was für Themen würde ich mir noch wünschen als Video-Tutorial?
Einledern, vers. Hülsen und wie diese hergestellt werden, Lederart und Gerbung erkennen, allgemeine Infos zum Thema Buch (Fachbegriffe, Historie etc), Schließenrestaurierung, Holzergänzungen, Retusche und die vers. Farbmittel/ Pigmente (Pro, Contra), lösen von alten Kaschierungen bzw. anlösen des Speigels o.ä., Klebstoffreste entfernen

D YouTube Metrics

D1 Overall views of the video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.

Videos	Videotitel	Veröffentlichungszeitpunkt des Videos	Aufrufe	Wiedergabezeit der Playlist (Stunden)	Wiedergabezeit (Stunden)	Abonnenten
Gesamt			7706	5.6376	269.5719	67
uudsTPI_IWQ	Humidification of paper	Nov 21, 2024	941	0.2834	28.7739	6
2Gf4w5uQqhk	Cellulose Ethers	Jan 23, 2025	663	0.0007	15.8469	4
JBtSiLBgg8o	How to sharpen a leather-paring knife	Oct 17, 2024	504	0.1692	15.9523	2
Rn-FkI-S9qk	Wheat Starch Paste	Oct 3, 2024	481	0.343	22.9294	6
jNJ7eqrY44s	Calcium Hydroxide Solution	Dec 26, 2024	404	0.3117	12.1966	3
8sYFR_51twv	Hinging: The V- and T-hinge	Oct 10, 2024	334	0.1664	13.804	4
uJpGtmXGoJE	Leaf Casting	Feb 27, 2025	322	0.1493	8.0815	2
ILta_zx-0FU	Stitching On Sewing supports	Nov 14, 2024	314	0.0636	10.327	4
0qSaD-PxPDk	Volatile Binders	Dec 26, 2024	308	0.3259	9.1306	2
vme9WHBrXiw	water drop test	Oct 24, 2024	307	0.1487	7.6472	2
lsP3X_9eJnY	Lining	Nov 7, 2024	298	0.4761	15.0351	6
k7PzuI6dua4	The Sewing Frame	Sep 26, 2024	296	0.2415	10.815	4
64-80Cmo3NA	Aqueous Treatment	Nov 28, 2024	262	0.4681	13.2274	5
KCbCjHHA178	Treatment Methods for Ink Corrosion	Jan 30, 2025	246	0.0713	10.4054	4
kXOq6xCVkrs	Skiving Leather	Jan 16, 2025	242	0.1683	9.0312	0
1EykmCItd0k	Poultices-Gels	Jan 9, 2025	224	0.0962	9.2251	5
YCAUvfoslaM	Saddle stitch binding	Dec 12, 2024	181	0.1082	5.1411	0
E9K1ibWZ4z0	Ionic Fixation	Dec 19, 2024	179	0.1984	8.3472	1
h0B-p2ApntI	Remoistenable Tissue	Feb 6, 2025	162	0.2265	5.9073	1
DF8mwITPR1c	Poultices-Pastes	Oct 31, 2024	138	0.242	5.1884	2
ONJn4oSc1Mc	Water Enrichment	Dec 5, 2024	138	0.2353	4.2975	0
gwq_miWfzCc	Chain Stitch Binding	Mar 6, 2025	137	0.1963	4.5298	0
1pNpJsyhQac	Loss Filling in Paper	Feb 13, 2025	134	0.2867	6.2567	1
0t1vwOCIpgo	Protein-Based Adhesives	Feb 20, 2025	130	0.106	3.9518	1
GWrmzpG1RM	Water Solubility Test	Sep 12, 2024	125	0.2255	4.3282	1
xZ38vBUoI9k	Damage Classification of Ink Corrosion	Sep 19, 2024	125	0.274	5.2853	1
yhqLRNoIZzo	Micro-Chemical Tests	Jan 2, 2025	111	0.0554	3.91	0

D2 Overall views of the German video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.

Videos	Videotitel	Veröffentlichungszeitpunkt	Aufrufe	Wiedergabezeit der Playlist (Stunden)	Wiedergabezeit (Stunden)	Abonnenten
Gesamt			10859	19.0342	554.9891	92
80V2X11DsSM	Kaschieren von Papier	May 20, 2024	1188	0.3675	64.7985	9
bceEiU5Jy-s	Leder schärfen	Mar 11, 2024	835	0.3452	46.1616	1
5_1Z_NTkah0	Heften auf Bünde	May 27, 2024	822	2.3532	26.5218	10
WUmg4T25hd4	Montieren von Papier	Mar 18, 2024	728	0.3516	26.6211	6
FNSXLD4C3A4	Ledermesser schärfen	Mar 7, 2024	714	0.5268	29.2049	1
M6fyjkSaul0	Kleister kochen	May 20, 2024	601	1.5823	39.4406	4
Li4arpDcMII	Fehlstellenergänzung	Mar 13, 2024	568	0.2701	39.9783	7
MYLe-8RE8a8	Die Heftlade	Mar 14, 2024	444	0.5081	21.0278	8
6SNg_7fgMq8	Anfasern von Papier	Jun 3, 2024	379	0.2482	23.7851	4
8ztpDvh43yw	Tintenfraß erkennen	Mar 7, 2024	360	0.4894	17.6701	7
lozQv5iD4CY	Celluloseether	Mar 9, 2024	348	1.4787	19.0684	4
fvXctT-BX2U	Wässern von Papier im Bad	May 8, 2024	339	0.4949	19.9323	1
plCuKIs4xFo	Remoistenable Tissue	Apr 30, 2024	332	1.1393	15.9989	2
mntojXQtUss	Kettenstichheftung	Mar 26, 2024	325	1.2469	20.4927	5
J2jIS12eHKc	Wassertropfen Test	Mar 15, 2024	282	0.3907	7.8745	1
-ls9Y6yBMUw	Tintenfraß behandeln	Mar 25, 2024	267	0.7118	20.6059	5
-mcz4EPB42k	Flüchtige Bindemittel	Mar 7, 2024	253	0.3727	12.7236	2
87QEoN2a7j0	Befeuchtungsarten von Papier	Apr 2, 2024	246	0.7089	18.4234	1
VyOYVn3eulk	Wechselstichheftung	Mar 28, 2024	240	0.5392	8.2588	4
nszZ7LmiO0s	Ansetzen von Gelen in der Restaurierung	May 6, 2024	237	1.3103	17.2344	1
CZASpIZ5J50	Ansetzen von Proteinklebstoffen	May 13, 2024	226	1.2963	13.6131	4
WfiYomj8hg0	Ansetzen einer Calciumhydroxidlösung	May 27, 2024	222	0.4212	7.9379	2
DUki9bhdPs	Ansetzen von Pasten (Kompressen) in der Restauri	Jun 3, 2024	205	0.3255	7.7357	1
YLx3ID46QQU	Wasser anreichern	Mar 20, 2024	197	0.5669	8.0211	0
daSbMBYrMNE	Mikrochemische Nachweise	Apr 12, 2024	175	0.5716	8.895	1
owcqJxhbBo4	Ionische Fixierung	Mar 22, 2024	164	0.2558	8.1867	1
cXU195RB64w	Test Wasserlöslichkeit	May 13, 2024	137	0.1611	4.1471	0

D3 Overall views of the English video tutorials with titles, time of publication, views, playback time of the playlist, playback time in hours and subscribers gained.

Videos	Videotitel	Veröffentlichungszeitpunkt des Videos	Aufrufe	Wiedergabezeit der Playlist (Stunden)	Wiedergabezeit (Stunden)	Abonnenten
Gesamt			7706	5.6376	269.5719	67
uudsTPI_IWQ	Humidification of paper	Nov 21, 2024	941	0.2834	28.7739	6
2Gf4w5uQqhk	Cellulose Ethers	Jan 23, 2025	663	0.0007	15.8469	4
JBtSiLBgg8o	How to sharpen a leather-paring knife	Oct 17, 2024	504	0.1692	15.9523	2
Rn-Fk1-S9qk	Wheat Starch Paste	Oct 3, 2024	481	0.343	22.9294	6
jNJ7eqrY44s	Calcium Hydroxide Solution	Dec 26, 2024	404	0.3117	12.1966	3
8sYFR_51tw	Hinging: The V- and T-hinge	Oct 10, 2024	334	0.1664	13.804	4
uJpGtmXGoJE	Leaf Casting	Feb 27, 2025	322	0.1493	8.0815	2
ILta_zx-0FU	Stitching On Sewing supports	Nov 14, 2024	314	0.0636	10.327	4
0qSaD-PxPDK	Volatile Binders	Dec 26, 2024	308	0.3259	9.1306	2
vme9WHBrXiw	water drop test	Oct 24, 2024	307	0.1487	7.6472	2
lsP3X_9cJnY	Lining	Nov 7, 2024	298	0.4761	15.0351	6
k7Pzul6dua4	The Sewing Frame	Sep 26, 2024	296	0.2415	10.815	4
64-80Cmo3NA	Aqueous Treatment	Nov 28, 2024	262	0.4681	13.2274	5
KCbcJdHA178	Treatment Methods for Ink Corrosion	Jan 30, 2025	246	0.0713	10.4054	4
kXOq6xCVkr	Skiving Leather	Jan 16, 2025	242	0.1683	9.0312	0
lEykmCltd0k	Poultices-Gels	Jan 9, 2025	224	0.0962	9.2251	5
YCAUvfoslaM	Saddle stitch binding	Dec 12, 2024	181	0.1082	5.1411	0
E9K1ibWZ4z0	Ionic Fixation	Dec 19, 2024	179	0.1984	8.3472	1
h0B-p2ApntI	Remoistenable Tissue	Feb 6, 2025	162	0.2265	5.9073	1
DF8mwlTPR1c	Poultices-Pastes	Oct 31, 2024	138	0.242	5.1884	2
ONJn4oSc1Mc	Water Enrichment	Dec 5, 2024	138	0.2353	4.2975	0
gwq_miWfzCc	Chain Stitch Binding	Mar 6, 2025	137	0.1963	4.5298	0
lpNpJsyhQac	Loss Filling in Paper	Feb 13, 2025	134	0.2867	6.2567	1
0tlvwOCIpgo	Protein-Based Adhesives	Feb 20, 2025	130	0.106	3.9518	1
GWrmzpGIRM	Water Solubility Test	Sep 12, 2024	125	0.2255	4.3282	1
xZ38vBUoI9k	Damage Classification of Ink Corrosion	Sep 19, 2024	125	0.274	5.2853	1
yhqLRNoIZzo	Micro-Chemical Tests	Jan 2, 2025	111	0.0554	3.91	0

D4 Video sorted by number of views by country.

Region	Aufrufe	Wiedergabezeit (Stunden)
Gesamt	33957	950.3408
DE	18203	441.1028
US	1588	51.7701
AT	1279	19.489
CH	914	17.0771
GB	188	7.8605
IT	155	5.1978
NL	155	7.4273
CA	95	2.2445
PL	71	3.953
AU	62	2.1229
IN	49	0.7714
GR	46	4.3546
FR	45	1.7162
ES	41	1.1586
BE	35	1.6785
DK	35	0.9741
LU	32	0.2054
RU	29	0,761
TZ	27	0.5635
BR	26	0.6046
TR	21	0.2753
RS	14	0.1273
HU	13	0.1115
AR	12	0.1357
IE	12	0.6929
SE	11	0.5132
JP	10	0.1301
PT	10	0.8044
PY	10	0.0631
SK	10	0.0648

D5 Number of views and playback time in hours per traffic source.

Traffic-Quelle	Aufrufe	Wiedergabezeit (Stunden)
Gesamt	33957	950.3408
Shorts-Feed	11025	72.3823
Funktionen zur Auswahl von Inhalten	7378	207.7738
Kanalseiten	4666	167.2581
Videovorschläge	3037	175.0061
Extern	2995	131.8392
YouTube-Suche	2301	73.1301
Weitere YouTube-Funktionen	1009	45.0724
Direkt oder unbekannt	804	37.5112
Playlists	473	27.9081
Benachrichtigungen	188	8.8537
Infokarten und Anmerkungen in Video	41	3.2274
Seiten mit diesem Hashtag	40	0.3784
Sound-Seiten	0	0