

Establishing earth building in teaching and vocational training

Earth building needs expertise: expertise in planning, in product development, in the actual construction work and also in marketing.

This presentation discusses possible strategies and projects – by the Dachverband Lehm e.V. and other organisations – for introducing earth as a building material into teaching and vocational training. The focus here is on initiatives within the German education and training systems but the principles are transferable to other countries and systems.

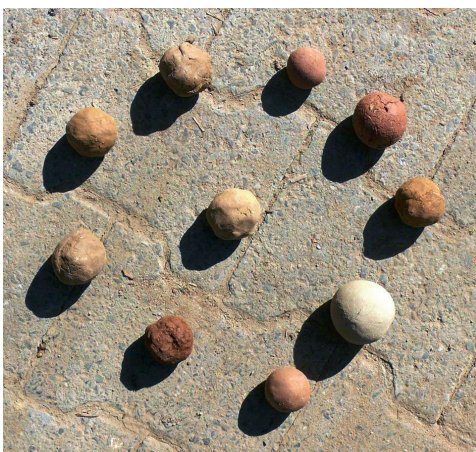
Building with earth, originally a craft rooted in tradition and vernacular building, has since become a construction technique planned by engineers and served by specialist producers. Earth building materials are now available in a range of products and forms more diverse than most building materials. Earth can likewise be worked in numerous different ways and used for a wide range of different applications. But building with earth is also a comparatively small sector of the building industry, and considerable commitment is required to raise its profile in a market in which regulations, norms and other legislative frame-

works are becoming increasingly important. The new requirements governing the material and its use require corresponding knowledge and skills in both the planning and execution of building works to ensure the durability of works over the warranty period and beyond. As such, there is growing demand for well-schooled, ideally certified, professionals with appropriate theoretical knowledge and practical skills.

After the anchoring of earth building skills in the list of subjects of the core curriculum for the vocational training of building professionals and the development of a corresponding training module for earth building as well as the establishment of a “specialist in earth building” further education course, the next stage is to promote the introduction of earth building skills at a broader level, i.e. as part of the basic initial training of building professionals.

The Dachverband Lehm e.V. would like to see earth building established as a dedicated training module in the national vocational training curricula. The introduction of new DIN norms for factory-produced earth building products in 2013 lends further impetus

Fig. 1 A diverse material available in a range of different product forms



	Occupational	Academic	Business and Industry
INITIAL TRAINING	Apprentices in: – the building trade	Students of: – architecture – construction engineering – interior design – natural sciences – materials testing	Apprentices in: – business and industry – trade – manufacturing – development
Means	Qualification module, Foundation year, Incorporation into the teaching of Technical Assistants for Conservation (DTA) and Timber and Structures Preservation (HuBS), Teacher training for vocational trainers	Seminar courses, theory and practice, elective modules, projects	
FURTHER TRAINING	– Journeymen or masters in the building trade – Experienced earth buildings	– Architects – Engineers – Restorers – Archaeologists	
Means	– DVL Specialist for Earth Building (FKL) – Designer in clay plastering	– CPD seminars “Earth building for architects and engineers”, “Planning earth buildings compact seminar” – “Modern Earth Building” Roadshow, elective modules at universities and universities of applied sciences	
INFORMAL TRAINING	Professional and private		
Means	Courses for children, schoolchildren, private individuals and professionals, clients and self-builders, Manufacturers schooling their partners in the use of their products Construction firms and craftsmen schooling colleagues in work on site Workshops in various formats – regional, national, international		

Table 1 Overview: Earth building in education and vocational training

to the need to incorporate earth as a regular building material in construction education.

In the building trade, responsibility for this lies with the chambers of trade and vocational training bodies. In the academic realm, this is the responsibility of the respective university faculties of architecture and engineering.

Earth building in vocational training and further education

At present, earth building does not feature in the occupational profile of builders and master craftsmen and consequently does not constitute part of the examination content.

Despite originally being a specifically learned trade, it is presently neither recognised as a trade in its own right, nor is it part of the training of other building trades.¹

Changes to training regulations must be agreed by the tariff partners – the Central Association (ZDB) as well as the Central Federation of the German Construction Industry, and the Industrial Trade Union for Building, Agriculture and the Environment (IG BAU) – in conjunction with the Federal Ministry for Economic Affairs and Energy. Negotiations are usually protracted and can take several years.

To this end, the Dachverband Lehm has developed a qualification module for earth building² that can be easily incorporated into the initial training of relevant building trades. Some individual chambers of trade have since incorporated this module.³ For further training, the Dachverband Lehm offers the “DVL Specialist in Earth Building” (FKL) course. Course graduates receive a certificate from the respective Chamber of Trades entitling them to be entered on the trades register as a “mason and concrete constructor” but restricted to the special category “earth building”



Fig. 2 Journeymen working on an earth building site in Herrstein, 2008



Fig. 3 Rammed earth element, DVL Specialist for Earth Building (FKL)



Fig. 4 Training wall at the ZAZ in Biberach

(Basis: HWO Trade and Crafts Code, §8: "Exemption permission").

For several years, the DVL has pushed for the inclusion of the FKL Earth Building Specialist course in the national recommended qualification framework. These recommendations are issued by the Central Association of the German Construction Industry (ZDH), which distributes it to the 55 Chambers of Trade in Germany.

One condition for inclusion is the expansion of the regular duration of the course from 120 hours to 200 training hours. This length would correspond to German Qualifications Framework Level 5 (DQR 5). In addition, to provide more time for related but somewhat neglected aspects such as business and marketing skills, the greater number of hours would also improve the quality of the graduates' skills.

Master thesis on occupational training

In October 2015, a master thesis was presented at the Technical University of Dresden, supervised by Marcel Schweder, a member of the DVL Advisory Board. The topic was "Ecological Building in Vocational Training. On the need for initial vocational training." Focussing especially on earth building, the author examined the need for a separate occupation for ecological building or better integration of the subject matter in other building occupations. The author concluded that at present the conditions are not given for the establishment of a separate occupation, but that earth building should definitely be incorporated into the training of other building trades and sustainability-oriented vocational training.

The DVL's long-term objective of "establishing a dedicated trained occupation" from 2012 therefore looks unlikely to be reached in the near future.

Table 2 Levels of the German Qualifications Framework (DQR)

DQR Level	Qualification
1 and 2	Preparatory and entry-level vocational training
3	2-year initial vocational training
4	3 or 3½-year initial vocational training
5	Further training
6	Bachelor-equivalent qualification, master, technician ...
7	Master-equivalent qualification
8	Doctorate



Fig. 5 Workshop: Vernacular architecture in arid climates. Students (HS Anhalt Dessau) on a tour of the Eco-House at the German University of Technology (GUTECH) in Muscat, Oman, which uses earth for passive climate control



Fig. 6 Architecture students from the HS Anhalt working in groups on a short design assignment at Misfah Al Abriyeen Oasis in Oman

In Germany, the central bodies for incorporating earth building into vocational training for the building trades are the Chambers of Crafts and Trades (Handwerkskammern). They act as intermediary institutions between schools or technical colleges and the construction firms, providing training for staff and trainees that a company may not be able to provide. The DVL wrote to all 55 Chambers of Trades and Crafts in Germany, informing them of the new DIN norms, the qualification module on earth building and the “FKL Specialist for Earth Building” further education vocational training programme, and offered assistance in their implementation. Only one Chamber of Trade has actively participated so far. As such, we are still very much in the starting blocks as regards establishing earth building in vocational training.

Earth building in academic education and continuing education

Universities

While changes to occupational profiles and vocational training curricula often take time to come into effect, universities are typically able to adjust their course content and teaching curricula themselves. Topics that are not explicitly part of the core curriculum can therefore be incorporated as elective modules and, if necessary, be taught by guest lecturers. Some 10-12 universities in Germany have incorporated earth building into their curricula in this way, usually as part of coursework on ecological and sustainable building, for example Aachen, Dessau, Hildesheim, Karlsruhe, Lübeck, Mainz, Potsdam, Stuttgart, and Wismar.

In 2013, the first Honorary Professor for “Building and Renovating with Earth” was appointed at Potsdam

University of Applied Sciences as part of the Master’s Study Program on Building Conservation at the Faculty of Engineering. The position was appointed to Prof. Dr.-Ing. Christof Ziegert.

An overview of the academic programmes available in Germany can be found on uni-terra.org, an online-platform established by the DVL (see below).

Consequently, ever more universities are undertaking interesting projects using earth as a building material, both in Germany and abroad.

In cooperation with the Bauhaus Weiterbildungssakademie e.V. (WBA – Bauhaus Further Education Academy) and the Bauhaus Universität in Weimar, the Dachverband Lehm runs a series of one-day compact seminars on “Earth building for architects and engineers”. This continuing professional development programme is designed especially for architects, planners and engineers.

A further initiative is the “Modern Earth Building” Roadshow, a new format that visits interested university departments and presents the building material and its use in a variety of projects.

Last but not least, the LEHM conferences offer a further means for the academic exchange of knowledge, information and opportunities between experts in the field.

DVL Earth Building Prize for Young Academics

The prize, awarded by the DVL for the first time in 2016, aims to promote the study of earth building in



Fig. 7 Visit to the oasis city of Nizwa in Oman to see the legacy of earth building in the country



Fig. 8 International participants of the *Singida Earth House Workshop* in Tanzania, August 2016

an academic context. It recognises academic work of excellent quality that demonstrates a firm knowledge of earth building and makes a forward-looking and original contribution in the fields of design, construction, research or development.

www.uni-terra.org

The website *uni-terra.org* is an international platform for the exchange of information, educational opportunities, projects, events, experience and know-how in the field of earth architecture and construction at an academic level. It aims to facilitate knowledge transfer between interested parties, academics, practitioners and education institutions with a view to raising awareness and spreading knowledge. The intention is to act as a resource for academics and students that can help anchor the topic in upcoming generations of experts.

Workshops and opportunities to take part in actual projects are also posted on the site: for example in

2016, *Lehmexpress* in Morocco, the *BASEhabitat* international summer school in Linz, Austria, the *Singida Earth House Workshop* in Tanzania, among others. These offer students the ability not only to gain practical experience, often in other contexts and countries, but also to strengthen their so-called *soft skills*, which are often neglected in the conventional education of architects and engineers but are invaluable for the complex requirements of the profession.

Informal training

In addition to formally-recognised training and education programmes, there are also numerous informal opportunities to learn or improve one's earth building skills and knowledge. Courses on everything from building an earth oven to decorative wall design methods and more are offered by a wide range of education institutions, contractors and manufacturers at all levels, from on-site courses for professionals to earth sculpture workshops for children.

Fig. 9 International participants of the *Singida Earth House Workshop* in Tanzania, August 2016





Fig. 10 Trutz Neubarth tutoring schoolchildren and exchange pupils in different earth building techniques



Fig. 11 Schoolchildren making light earth bricks as part of the Biobauernhof Project

Organisations such as Bunte Kuh e.V. (www.buntekuh-hamburg.de) in Hamburg, FAL e.V. (www.fal-ev.de) in Ganzlin or LehmbauKontor Berlin-Brandenburg (www.lehmbaukontor.de) offer courses for children, schoolchildren, professionals and private individuals and clients interested in self-building.

Product manufacturers offer courses for partners, contractors and distributors. Construction firms school their staff and sometimes colleagues in the necessary skills. All these contribute not only to promoting building with earth but also to improving the quality of earth building work. The Dachverband Lehm provides information material and brochures that organisations and suppliers can distribute to their course participants.

Activities by DVL members and companies

Various members of the DVL undertake local initiatives or projects that raise awareness of earth building and other, often related, alternative building methods. Ultimately, all the association's members are in one way or another potential promoters of earth building in their own private or business networks, and thus contribute to the work of the association at a most fundamental level.

School projects

Trutz Neubarth, a member of the DVL, is a project partner of the Biobauernhof (organic farmhouse) project at Seeschule private school in Rangsdorf near Berlin, funded by the Brandenburg-based SPI Foundation (Sozialpädagogisches Institut Berlin "Walter May"). He contributes his know-how as an earth builder to help schoolchildren construct a classroom building. Together with the children, he built a

timber-frame construction and filled the panels with light earth brick masonry. The light earth bricks were made by the children as part of a school project.

In another school project, he contributed his knowledge as an earth builder for the rebuilding of a synagogue in Stavenhagen in the state of Mecklenburg-Vorpommern. The project brought together schoolchildren from Israel and Germany to help restore sections of the synagogue, which was partially burnt down by the Nazis. The children learned how to lay earth brick walls, to insulate with light earth and to plaster with clay plaster.

These are just some examples of how earth building can be incorporated into school education.

Hitzacker – a multicultural, multi-generational village

A cooperative initiative in the German Wendland region aims to offer a model for addressing the refugee crisis in Europe by promoting ways in which different cultures and age groups can complement one another. Together with refugees they intend to build a multicultural, multi-generational village using earth as one of the primary building materials. As part of the building work, the village founders aim to train refugees in construction work and in the long-term to establish a training programme. What will begin as informal training in construction and earth building will over time transition into a formal training programme. Here, the absence of earth in the regular training curriculum is compensated for by the knowledge the trainees bring with them from their prior experience. Projects of this kind offer a model for other education organisations and initiatives.

Germany currently has a shortage of skilled workers in the construction sector. Projects such as Hitzacker have the potential to tackle the problem of skills shortage while simultaneously promoting earth building.

The slow process of change in formal vocational training curricula means that informal training opportunities are a particularly effective way of raising the profile of earth building. In this respect, federal programmes for integration represent a potential opportunity for promoting earth building. At the same time, these programmes may introduce more flexible paths to vocational qualification. As such, we see the integration of refugees as an opportunity to tackle both the problem of skills shortage and to promote earth building.

Conclusion: Earth building needs expertise.

Possible pathways to improving earth building expertise ...

... in the building trades

Can we revive earth building as a new “old” occupation? This is a vision we would like to see become reality.

Aim 1: Integration of individual specific earth building modules in current vocational training curricula for masons, plasterers, painters and other trades, for example heating installation engineers. Building and designing with earth must become a core element in teaching curricula and the corresponding examination regulations.

Aim 2: The establishment of a new occupation for the “old craft” of earth building. The range and diverse applications of earth as a material for construction and design is broader than for most materials and spans the domains of several different trades.

Aim 3: To improve the quality of training in earth building: This begins with identifying and agreeing the most important course content for earth building and the corresponding qualifications. A major step in this direction has been achieved by the international PIRATE project (Provide Instructions and Resources for Assessment and Training in Earthbuilding) funded as part of the EU Leonardo da Vinci programme. Over a period of four years, 18 partners from 8 countries (including the DVL and some of its members) have

jointly agreed and set out the necessary skills, knowledge and competencies required for earth building in different fields and at different levels. The results of the project are available online at: <http://ecvetearth.hypotheses.org>.

Alongside the above, we see the integration of refugees as a possibility to anchor earth building skills informally and later formally in the education of future skilled workers.

...in university education

Here too it is necessary to introduce earth building as a core element of the studies of architecture, engineering and interior design as earth building also requires specialist planning knowledge. The next generation of professionals as well as existing professionals (through CPD seminars) need to be brought up to date with current standards and techniques, especially in the context of ecological building. The elective modules offered at some universities are already a step in the right direction. To be more consistent, however, earth building needs to be incorporated into the curricula of universities. The study regulations of most universities already outline learning targets and outcomes for improving awareness of sustainable and holistic approaches to construction and design. The introduction of product norms for earth building products needs to be reflected in academic education, just as it does in vocational training.

...in product develop and marketing

Two further areas in which earth building skills are in demand are the development of new products and the marketing of earth building materials and their proper application. Both play a central role in improving the quality of earth building as a whole. Two key areas here are the training of staff to provide them with the corresponding specialist knowledge and the undertaking of research programmes at universities, both of which have been successfully put into practise.

Finally, as we have seen above, in addition to recognised training and educational formats, informal training opportunities remain an important way of communicating skills and knowledge and of promoting earth building as a whole.

Footnotes

- 1 In Germany, vocational training is formalised in the Vocational Training Act (Berufsbildungsgesetz BBiG) for a series of nationally-recognised vocations, each of which has their own regulatory framework. These vocations learn theoretical knowledge at technical training colleges and practical skills in partner firms (so-called *Dual System*). Training in companies must be undertaken by a qualified *meister* or trainer who will have undertaken appropriate vocational teacher training.
- 2 Several vocational training institutions already incorporate earth building modules in their curricula (Stage 1). The DVL has been involved in a project since 2008 to develop a national qualification module "Construction of building elements with earth building materials" at the BE Knobelsdorff-Schule in Berlin (in accordance with the BBiG). In 2009, the Chamber of Crafts and Trades in Berlin certified that the module corresponds to the national criteria set out by the Central Office for Continuing Education in Skilled Trades (ZWH). This means that this module can be used nationally in the vocational training of masons and bricklayers.
- 3 Further information on the qualification systems for vocational training can be found in "Bildung im Lehm" [1] by Horst Schroeder et al.

References

- [1] Schroeder, H.: Bildung im Lehm – Erfahrungen des Dachverbandes Lehm e.V.. In: LEHM 2012, Tagungsbeiträge zur 6. Internationalen Fachtagung für Lehm, Weimar 2012, S. 184-196.
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