Provide Instructions and Resources for Assessment and Training in Earthbuilding: The PIRATE project in Europe and beyond

M. Bown¹, L. Dider², M. Mas¹

1. ESTEPA - Estudios Sobre Tierra: Energía, Patrimonio y Ambiente, Paredes de Nava, Spain
2. CRAterre Centre International de la Construction en Terre, ENSAG, Grenoble, France

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*Corresponding authors: Ms. María Brown, Tel: +34 652 501 080; E-mail address: estepa1@gmail.com

Abstract

Earth still is the most universal building material: one third of mankind actually lives, works, studies and prays sheltered by structures very differently conceived, shaped and finished, using the soil under our feet. Traditional or modern, vernacular or monumental, earth’s thermal, environmental, cultural, aesthetic, social, economic behaviour and potential is clear for all of us familiar with this material.

The PIRATE project aims to disseminate and strengthen these advantages among those not yet aware, at all levels: actual and probable users, young or experienced masons, decorators and architects, training institutions, stakeholders, governments. To achieve this goal eighteen organisations from eight European countries, all active in the earth construction sector as professional associations, training providers or small companies, have come together to develop Units of learning outcomes and get them recognised within national certified courses. The project complies with the ECVET-European Credit system for Vocational Education and Training, an instrument to support lifelong learning, mobility and flexibility of learning pathways to achieve qualifications.

During three years we have analysed crafts and trades and identified common learning outcomes until achieving the final product: the ECVET Earth Building Units we are now presenting beyond the European boundaries. These Units, vehicles of shared standards of competence needed by this professional sector, will:
- empower professionals, offer modular qualification, encourage employment opportunities and mobility;
- guide teachers when defining new content for teaching and assessment procedures;
- be a tool for certifying bodies reviewing or creating transnational qualifications.

Interest is already increasing both for craftspeople and in higher education as they get ready to offer this outcome-orientated training and certification, as a first step towards the creation of new qualifications integrating these units.

Keywords: Earth Building, Vocational Education and Training (VET), Learning Outcomes

1. Introduction

The European Union has created a variety of instruments designed for the exchange of experience and knowledge among the country members. In the Earthbuilding Training area we are addressing here, we must highlight the EQF -European Qualification Framework, the ECVET -European Credit system for Vocational Education and Training, and the LLL –LifeLong Learning Programme. We’ll gradually introduce them in order to explain what PIRATE, our Earthbuilding ECVET project, is (Didier et al, 2010).

The LLL Lifelong Learning Programme provides mobility of trainers and trainees among institutions; its former LdV -Leonardo da Vinci sub-programme (now ERASMUS +) is designed for the Vocational Education and Training sector, increasing the training and mobility opportunities for students, trainers, active professionals, qualified workers lacking certification, vulnerable population. Under the LLL-LdV programme there have been many projects focusing on Earthbuilding in 18 European countries since 2002. This ever-since growing community of exchange and practise connects learners, professionals and trainers. The growing interest and offer of courses at university, technical and informal levels speak for itself: practitioners and scientific partners need each other for cross fertilization.

2. What is PIRATE?

Let’s now concentrate on our subject: earth. While other building technologies have created norms as a
pattern of practice, earthbuilding hasn’t. Norms and standards are commonly related to products, nevertheless product standards -when existing- cannot get far without trained workers: who will design and build with these products? Training standards and codes of practice require urgent attention if earth is to compete with ‘conventional’ construction. That is one of the reasons why this PIRATE project (LdV 2012-2015) was conceived (Jorchel et al, 2014).

These new standards have to comply with two European tools shaping the actual VET scenario: the EQF European Qualification Framework, and the ECVET European Credit system for Vocational Education and Training. PIRATE applies them to the earth building sector, but what are they?

The EQF is a framework to compare qualifications beyond national systems, according to eight reference levels ranging from basic Level 1 to advanced Level 8. It applies to all types of education, training and qualifications, from school education to academic, professional and vocational (European Commission, 2008). In the construction sector Levels 3 and 4 apply to workers taking responsibility for completion of tasks (L3) and exercising self-management (L4), in usually predictable contexts.

Levels 5 - 6 apply to supervisors managing technical activities, responsible for decision-making in unpredictable contexts. The design work of architects and engineers belongs to level 7. PIRATE addresses Levels 3, 4, 5 and 6.

ECVET is an instrument to support lifelong learning, the mobility of European learners and professionals and the flexibility of learning pathways to achieve professional qualifications (ECVET, 2010). ECVET is meant to become a ‘translation’ tool for the different national educational systems, allowing learners to validate in their own countries the training and certification received abroad (already happening through ECTS credit system for Erasmus mobility at university level).

A very important EQF and ECVET feature is the learning outcome approach: this approach shifts the focus from the traditional system emphasising ‘learning inputs’ such as programmes with a fixed duration delivered by certain type of institutions. Instead, in the learning outcomes approach the assessed person shows what he/she is able to do: the validation of non-formal and informal learning, thus encouraging lifelong learning, is the highlight of this approach.

Figure 1: PIRATE partners and their countries

PIRATE - Provide Instructions and Resources for Assessment and Training in Earthbuilding, represents eighteen institutions from eight countries: Czech Republic, France, Germany, Portugal, Serbia, Slovakia,
Spain and UK. The partners are recognised in the field of earthen construction and training, whether in new build or conservation. Many were involved in the earlier “Learn With Clay” plasters project (Learn With Clay, 2009), so the experience in writing, publishing, using training standards across the partner countries is guaranteed.

This previous experience has been fundamental for showing another reason for PIRATE: the need to go beyond surfaces and focus on load-bearing earth building techniques. A double challenge this PIRATE project has accepted: despite the cultural, historical and economical differences and the diversity of earth building practices between countries, there is consensus about the need of quality standards for training in structural earthbuilding across Europe. Equally, the consensus on guidelines and objectives for Earthbuilding VET will make earth more visible for the new building, renovation and decoration sectors; bringing earth to the centre of building culture once more.

To increase the potential impact, another LdV Project: “New Members for ECVET Earth Building”, has taken place in close relation with PIRATE. Adding Poland and Cyprus to the list, here old “plaster” and new “building” partners work, exchange and learn together integrating a whole system.

3. PIRATE process

For the first time, professionals in the construction sector, vocational education and training and higher education institutions from eight European countries work together. The project partners bring many years of experience in the field of eco-construction, renovation and decoration with unfired clay materials to the project. They include practitioners, company owners, architects, trainers and academics. All the partner organisations can rely on a network of regional or national specialist practitioners and teachers.

One of the challenges to the partners has been to find a means to bring all this experience to a common point of understanding and expression. The situation and state of the art in earth building in the eight countries of the 18 partners is quite different and not easy to compare.

To develop competence standards for EQF levels 3 to 6, the project pursued two different objectives:
- Outputs, by describing learning outcomes and gathering them as units classified according to the main working and market activities;
- Dissemination, by involving decision makers to get these units recognised and used in national qualifications.

The work was divided in three groups: MONO, BRICK and SUPERV. The first two groups focused on EQF Levels 3 and 4 monolithic and masonry earth systems –walls, vaults, domes, stairs, etc.- respectively. The third group applied for EQF Levels 5 and 6 both for monolithic and masonry systems. Nevertheless there are links between all the groups that assure a convergence, merging the units to as common an output. In a long process of several feedback loops and translations from national languages to English and back again, the
partners have analysed the existing crafts and trades involved in earthbuilding, presenting earth as a building material which can be assessed to a common standard.

After PIRATE kick-off in 2012, the first step was a consultation process with every partner’s national network of earth building practitioners: about 100 specialists from different earth building cultures and trends from all over Europe helped the partners define the skills, knowledge and competence required by a professional to build and repair earthen constructions.

The second step was sharing and merging the national written proposals into a single European one, agreeing on a preliminary list of Units, for each group: Mono, Brick and Supervision. Several sectorial meetings took place during 2013 and 2014 hosted by most partners, to achieve this result. Merging the European sectorial work into a single PIRATE result begun during a second overall meeting in 2014 where many plenary decisions could be made, and was completed that year.

As a third step, in 2015 and after a final plenary meeting which allowed the consortium to gather every output, a final document has been produced with all the new units and assessment criteria for four Levels, translated into the eight project languages. A project brochure presents a summary of the tools and how to use them.

Even if the results are beyond the time limit of the project, the ongoing exploitation work involves finding the key actors for setting the possible certification scenarios in each country.

4. Feedback and self evaluation

To evaluate the process itself beyond the meetings and the dense online work, feedback of two kinds has taken place: trial assessments for Mono and Brick groups, and frequent contact with national teams.

- Feedback from Test Meetings: The aim of PIRATE is not giving rules on how to assess; indeed, exams differ from country to country. In Mono Test the discussion focused on core criteria for assessing during a rammed earth test, using a draft list reviewed and completed during the meeting. The framework was the usual ECVET format: knowledge, skills and competence were assessed through written, practical and oral exams.

![Figure 3: MONO and BRICK Test Meetings](image)

With previous Mono test experience, the Brick Test meeting went further: it included mobility and language issues, and candidates executed the practical tasks in teams of four, adding an additional dimension to the test. After the exam, discussion focused on the improvement of criteria and indicators; some issues were found to need clear instructions to the assessors. The consensus is that every criteria and indicator has to be assessed: if not practically, orally or written.

- Feedback from national teams. Throughout the PIRATE project the link between partners and their national network of specialists and practitioners was never interrupted. In fact, several have participated in meetings and tests. With the final versions translated, those specialists, practitioners and organisations representing the building sector got involved in the qualification review, giving a last input for a final touch before PIRATE public release.
5. PIRATE outputs

As already explained, PIRATE outputs are not training materials - deceptively many people not familiar with ECVET - but new tools and resources acting as real standards of competence in Earthbuilding. These outputs are:

- a common-core syllabus for earth building activities in crafts and trades;
- a European-wide matrix of Units of learning outcomes for earth building with assessment criteria, both for load-bearing earth masonry and monolithic walls, available in eight languages.

These outputs are a guide to trainers and assessors but are not prescriptive about the setting or structure of the training. Thus training may be delivered on site in one country or institution, and in schools in another, delivered by experienced trainers with or without a diploma.

An unexpected output was that PIRATE has given a more international direction to the partners, increasing co-operation and networking and sharing experience.

5.1. Units of learning outcomes

ECVET Earth Building Units of learning outcomes are conceived for construction, renovation and decoration with unfired clay materials. These PIRATE new specific Units for load-bearing systems are:

**Figure 4:** PIRATE six Units detailed contents for EQF Levels 3 to 6
P - Brick Production
B - Building
F - Framework
adding to the existing LEARN WITH CLAY Units (2007, now renamed with letters):
C - Clayplaster
D - Interior Design
O - Decorative techniques
Some Units which conform to both systems are now merged, becoming a single Unit:
M - Raw Material
R - Renovation/Rehabilitation
E - Marketing
So we are now having a large matrix of nine Units: M P B F C D O R E.
Each Unit relates to a set of tasks which form an activity specific to earth construction sites. Each activity -
thus each Unit - may be considered either as a work place for a person on a building site, as a job position of a
person in a company, or as an activity a whole company is specialised in.
Units are defined by a set of knowledge, skills and competence needed to carry out this activity:
- Knowledge is factual and theoretical, described by a list of topics;
- Skills are cognitive and practical, and are described by a list of actions;
- Competence describes the responsibility and autonomy of a person in a given situation;
- Criteria and Indicators. While criteria to be used for assessment vary depending on the Unit content,
  precise indicators allow a decision whether a skill is achieved or not.
All as a whole are used to assess through a practical, written and oral exam:
- The practical exam concerns the skills and autonomy of trainees. Their duration to be established by the
  assessors, it can be organised in workshop or real working site backgrounds.
- The written exam concerns the knowledge. Usually a questionnaire with choice, open or graphic
  questions, also here the assessors are free to decide its structure and duration.
- The oral exam is an exchange between trainee and assessor; questions may concern skills, competence
  and/or knowledge. Again, assessors lead the interview in the way that they prefer.

Figure 5: PIRATE Units: Page 1, Knowledge Skills and Competences; Page 2, Criteria and Indicators

We believe these Units of learning outcomes, as vehicles of new standards of competence, will:
- empower professionals and offer modular qualification:
further skills training to help job search;
- encourage employment opportunities and mobility;
- guide teachers when defining new content and assessment procedures;
- be a tool for certifying bodies when reviewing or creating qualifications, looking for transnational compatibility.

**Figure 6:** Unit B L4: Knowledge, Skills and Competences in English, French and Spanish

### 6. Certification and MoU

We are at the beginning of a process: there will not be a European diploma for earth builders at the end of PIRATE project, as ECVET does not lead to a transnational certification. Even though, criteria and indicators for assessment help create a common quality standard, and certificates are delivered to valorise the achievements of those successfully passing an exam.

While the units get recognised for a diploma in each country -a long process- the value of the ECVET Earthbuilding certificates will result from their widespread use amongst a training community in 18 countries already involved in European earthbuilding learning and training projects. The framework for delivering and recognising these certificates is a Memorandum of Understanding -MoU. From its first signature in 2009, fourteen centres from seven European countries have agreed in an original MoU to apply the European tools ECVET and EQF. This has increased the possibilities for these centres to issue ECVET Earth Building certificates, and for their learners to take part in ECVET earthbuilding courses and exams. More than 500 ECVET certificates at EQF Levels 1 to 4 have been issued altogether and the number keeps growing.

Organisations signing the MoU committed themselves to:
- offer or support training in earth building techniques;
- offer assessment for the units of learning outcomes of the ECVET Earth building using the agreed criteria and indicators;
- recognise the certificates delivered by the other partners;
- work towards an official recognition and integration of units of earth building learning outcomes in national qualifications.

Many VET providers are interested in signing this MoU, enlarging their training programme to sustainable building techniques and offering qualified learning outcome orientated certificates, seeking also for experience as trainers in earthbuilding abroad. Thus, as the existing MoU needed adjusting to meet this growing interest, another LdV project was designed: “New Members for ECVET Earth Building”, completed in July 2015 and in close relation with PIRATE. This mobility Partnership project aimed to:
- produce an online database for documentation of all issued ECVET Earth Building certificates;
- write an adjusted Memorandum of Understanding following new European recommendations.

“New Members for ECVET Earth Building” allowed additional mobility for learners and trainers eager to exchange experience in ECVET courses and exams in order to apply for a membership of the new MoU-Partnership ECVET Earth Building. By their nature mobilities also help further dissemination of
Earthbuilding ECVET, offering exchange among old ‘plaster’ and new ‘building’ partners.

6.1. Expected results
As previously explained, PIRATE work is just a first move in finding the key actors for setting the certification scenarios in each country, creating national committees to develop strategies for the integration of the ECVET Units in qualified courses and certified assessment standards. On the other hand, the units are a basis for development of teaching contents. Partial contents of ECVET LEARN WITH CLAY are already offered by many training providers, with an agreed common core teaching content. This work is still to be done for rammed earth, cob and earthen masonry, new and rehabilitated, and the earthbuilding sectors’ input will be again needed to collect best practice and know-how… an ambitious follow-up objective after PIRATE.

7. Dissemination: Europe and beyond
The dissemination activities of the consortium have evoked an increased interest in education and training for both craftspeople and in higher education. A growing community of training providers is interested in offering outcome orientated training, and in creating new qualifications by integrating these new Earth building units, offering ECVET Earth Building certificates in future. Dissemination will increase by addressing both training providers and a wider earth building community. Like the LEARN WITH CLAY already published, the new PIRATE units will be online and free for download. The project can be followed online at <http://pirate.earthbuilding.eu> where deeper contents, newsletters, leaflets, can be read or downloaded.

Figure 7: Dissemination leaflet introducing the PIRATE ECVET Units, available in eight languages

This brings us to our last point: dissemination begins in Europe but becomes global. Anyone around the world interested in using the Units, officially by creating new MoUs, or as a training and assessment guide, will be able to do it. English, Spanish, French or Portuguese are spoken alternatively by almost the whole planet making it feasible. It’s true PIRATE is conceived in Europe and for Europe, thus responding to the European context and needs:
the project aims originally to disseminate the cultural, ecological, technical and aesthetic benefits of modern earth construction by creating lifelong learning opportunities, thus also addressing social needs.

But how will ECVET Earthbuilding (PIRATE + LEARN WITH CLAY) adapt to the rest of the concerned world—the greatest part of it beyond Europe indeed. No doubt the priorities of Africa, Latin America or Asia will be much focused on economic, cultural and technical issues. Many are the actors already aware of earth construction by creating lifelong learning opportunities, thus also addressing social needs.

PIRATE through networking and common intercontinental work, and this is their response to PIRATE’s first dissemination steps abroad, carried out by many of the partners working overseas:

In Africa both anglo and francophone, there will very probably be an interest in some of those countries with already published earth building standards, some from as early as 1996 (Cid et al, 2011): Kenya, Nigeria, Zimbabwe, Swaziland, Zambia, Senegal, Tunisia among them. In general, the Ministries of Education support any knowledge transfer they might better respond to local needs improving the population conditions, and earth has never been banned from any technical teaching programme.

PIRATE project results clearly show these are genuine contemporary issues to be addressed, shared worldwide yet differently. Local situations will be better heard with these subjects put in black and white. It’s early to know if contents will need some adjustment to be relevant and understandable in most places. Yet adaptation will be needed for local technologies (less mechanical, more manual, both existing in the Units) and the available resources from institutions. PIRATE can also show a simple method to attain results and to present contents, in order to validate competences at different levels.

In Algeria there’s a clear interest in the implementation of an earth building pathway both at university and technical levels. The official position is the one held by CAPTERRE – Algerian Centre for Earth built Heritage, public and depending on the Ministry of Culture. This new institution is supporting the re-launching of earth as a building and rehabilitation material, recovering the knowledge and competence needed for the preservation of Algerian architectural heritage, mostly earth-built.

Morocco is a popular destination for French and German universities offering their architecture students to discover its rich earth building culture. As a result, awareness is growing about earthen architecture, related university studies, available competence, quality issues, the need for qualified professionals: a good starting point for further development and implementation of PIRATE results.

In Sub-saharian Africa the NGO Misereor has launched a slow process of introduction of Level 3 PIRATE principles into some of the VET Centres they run in Congo, Angola and Ghana: three languages for seven centres. Their objective is an evaluation of results related to local employability: if succeeding, they will raise awareness in all their sub-saharian centres.

In Benin earthbuilding is not formally taught, but the DUAL system (learning while working) puts many masons in contact with local techniques very widely used. Since 2014 different institutions have shown real interest in developing certification tools that might improve their technicians’ skills and recognition: SENS Benin, la Voute Nubienne, DEDRAS, P-DIEM, and members of the MESFTPRIJ -Ministry of secondary, technical and professional education, and youth reconversion and insertion. As to begin with, trainers at CFP technical centre and the Lycée Technique de Djougou are interested in testing PIRATE units and certifying learning outcomes in Earth building.

In Rwanda, framed in their technical training support programme, the Swiss Cooperation has just begun the process for the integration of earthbuilding architecture in the Rwandese technical schools system. Their perspective is ensuring that future building professionals become able to better answer the needs of a very large public (most of Rwanda population) with no access to manufactured building products (bricks, cement, concrete) but, nonetheless, actually taught almost exclusively in the technical Centres. A first pilot application in July 2015 is about adobe production and building.

Now let’s move farther into America…

In Argentina the UTN Technological National University, with 29 faculties along the country, is also interested: the Civil Engineering Faculty in Santa Fe, experienced in earthbuilding, considered testing PIRATE in a technical regional training. At higher levels they find it useful for skills and teaching quality certification for trainers. Facing a very uneven market of informal training offering no guarantees, PIRATE is seen as a model to take ideas from, and potentially establish a cooperation agreement. The results of UTN regional workshops, conferences and meetings are merged in a synergic networking involving the whole University, thus the whole country; with PIRATE to be discussed in their August meeting. Also in Santa Fe, TEKO Cooperative –very active adobe and CEB builders- agrees about the importance of this tool at a technical level, for quality and competence. Further north, in Tucumán the CRIATIC – Regional Centre for
Research in Earthen Architecture, as a University of Tucumán body, is interested in the training features of ECVET Earthbuilding. Their priority is to evaluate its potential impact and afterwards, adapt the system to the available resources for implementation: mobility of trainers, equipment for training and assessing, etc.

Also ECVET Earth Building has risen the interest at the UNBA National University of Buenos Aires, largest of the country. Their ARCONTI programme (Earth architecture and building) in the IAA American Art Institute, Faculty of Architecture, is dedicated to systematic research, teaching, extension, consulting and didactical design for earthbuilding in Buenos Aires and all the country. They find it an interesting tool at university, technical, trade and general public levels to strengthen local development and social technologies, with a middle term implementation in teaching and training structures but also at cultural centres, local governments, political organisms and research institutes.

In Chile, the Arts and Crafts School ‘Fermín Vivaceta’ and Tierractual centre altogether, in Santiago, teach the crafts related to heritage techniques, with earth very present. They are very interested in assimilating ECVET Earthbuilding and ready to begin with plasters, to improve their training offer achieving excellence at a time; they wish to spread it to the whole American Arts and Crafts Schools Network. ARCOT, Chilean University Earthbuilding Network, is also interested. As for target groups, both university and technical levels are considered, yet the technical one seems easier to begin with, adapting contents to specifics when necessary.

In Ecuador, the FAUC Faculty of Architecture and Urbanism and the National Institute for Heritage in Cuenca are interested in teaching and training of architects, technicians and masons.

In Colombia the SENA-Servicio Nacional de Aprendizaje (National Learning Service) has shown their interest at Technical Education level, and Architecture and Engineering Schools at University levels.

In Central America the MAK –MesoAmeri-Kaab, network of 15 institutions from four countries involved in earthbuilding promotion for sustainable housing in a social context, will also consider the adaptation of PIRATE.

8. Conclusions

The strength of PIRATE project lies in the fact that:

- its products are the result of a long discussion process between very different actors of the earth building sector all over Europe;
- practitioners from inside and outside the consortium have been very closely associated to the development throughout the work;
- the results will be available in eight languages, many of them being of use in other countries and continents, making transfer possible straight away;
- members of the PIRATE organisations themselves are involved in collaborative networks all over the world, thus being the ones that can directly be carriers of the contents to other colleagues;
- the content of the Units is both very precise and concise: a solid base for further developments, especially course contents;
- the matrix is designed to allow future enlargement to other levels (architects and engineers) and other contents (wattle and daub, light clay…).

We partners will be happy to accompany any organisation interested in adopting these certifications, courses or exams. And even if the MoU is designed for enlarging the ECVET Earth Building community of practice within Europe, if “the rest of the world” knocks on our doors, we will open!

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