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WP 1 – Methodology

D1.2 Process plan for building courses

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About TeacHy

As the FCHT industry gradually emerges into the markets, the need for trained staff becomes more pressing. TeacHy2020, or short TeacHy, specifically addresses the supply of undergraduate and graduate education (BEng/BSc, MEng/MSc, PhD etc.) in fuel cell and hydrogen technologies (FCHT) across Europe.

TeacHy2020 will take a lead in building a repository of university grade educational material, and design and run an MSc course in FCHT, accessible to students from all parts of Europe. To achieve this, the project has assembled a core group of highly experienced institutions working with a network of associate partners (universities, vocational training bodies, industry, and networks). TeacHy offers these partners access to its educational material and the use of the MSc course modules available on the TeacHy site. Any university being able to offer 20 to 30% of the course content locally, can draw on the other 80 to 70% to be supplied by the project (and its successor entity that will support the platform post-project).

This will allow any institution to participate in this European initiative with a minimised local investment. TeacHy will be developing solutions to accreditation and quality control of courses, and support student and industry staff mobility by giving access to placements. Schemes of Continuous Professional Development (CPD) will be integrated into the project activities. We expect a considerable leverage effect which will specifically enable countries with a notable lack of expertise, not only in Eastern Europe, to quickly be able to form a national body of experts.

TeacHy will offer some educational material for the general public (e.g. MOOC's), build a business model to continue operations post-project, and as such act as a single-stop shop and representative for all matters of European university and vocational training in FCHT. The project partnership covers the prevalent languages and educational systems in Europe. The associated network has over 70 partners, including two IPHE countries, and a strong link to IPHE activities in education.

Deliverables Abstract

The deliverable contains an overall process plan for the development of courses which will be established at the various levels using the teaching and training material contributed from the partnership network.

1 Focus course

The TeacHy courses will be built on the basis of the material collected from the participants and associated network.

The teaching material developed within TeacHy has the potential to be used in a number of different teaching contexts, including BSc/BEng/MSc/MEng/PhD and vocational training/ CPD courses.

In order to focus the effort of the consortium it was decided to limit the full course development to the material for the Master of Science Course to be established and run in WP 3.

The material developed in this context can then be adapted to the other teaching contexts, parts can be used separately with smaller changes for shorter courses, or for vocational training, all this based on feedback from the associated network.

1.1 Master of Science Course

The hydrogen and fuel cell curriculum developed in the TrainHy will be used as a starting point for the development of the Master of Science course.

The course has to be organised into a number of different modules covering the major parts of the curriculum, and potentially allowing for a certain degree of specialisation within the topics, based on student preference.

An additional challenge is to allow for adaptation to the different requirements for a MSc course at the different partner Universities, i.e. 12 months at UK universities and 18 or 24 months in other parts of Europe (all including the final research thesis).

2 Master of Science course building plan

The following process steps will be used for the development of the Master of Science course.

2.1 Initial Master of Science Course run

2.1.1 Modules selection

Based on the TrainHy curriculum the MSc course will be split up in a number of modules, covering logical parts of the hydrogen and fuel cell curriculum.

The modules will be split in to 3 groups.

Mandatory modules (all modules are mandatory)

Core modules: Covering the basic knowledge needed, such as thermodynamics and electrochemistry.

Introductory modules: Introduction to general concepts and specific technologies

Applied modules: Experimental Labwork (remotely managed), virtual labs.

Elected modules (students select a number of modules, specialisation)

Fuel Cell and Hydrogen applications and Fuel Cell types, advanced characterisation etc., specialised and advanced topics.

The students will have the possibility to specialise within the field of FCH, by selecting courses in this block.

Additional modules

Modules that cover more advanced topics, and topics that are peripheral to the main curriculum, both can be used when additional ECTS point are needed, or to adapt to different requirements for a MSc course (mainly in terms of the length of the total course).

2.1.2 Module responsible and content development

Responsibility for each of the defined modules making up the full course will be assigned to specific consortium partners. Responsibility will be assigned based on previous experience with teaching in the topic and research area, so that the teaching content can be closely linked to state-of-the-art research and teaching, where relevant.

The partners have the overall responsibility for creating the teaching material needed for a module, based on the material collected in WP2, and collaboration with other partners.

Each module will be broken down to a number of lectures covering the module topic, and fulfilling the requirement of approx. 5 ECTS per module.

The language for the first run will be English.

2.1.3 Initial trial run requirements

For the initial trial run of the course, each module will as a minimum have to consist of the following material

- A module plan/curriculum.
- A slide deck or compendium containing the written material used in the module as well as assignments for the students to complete.
- A (video) recording of each individual lecture.

Additional material might be used, such as virtual labs, simulation, additional reading material, quizzes, tests etc.

2.1.4 Learning platform.

For the initial run the University of Birmingham's Canvas platform will be used for hosting the Teachy material, in order to ensure easy access.

The material will later be transferred to the Net-tools platform and adapted to this, if feasible.

2.1.5 Peer review and refinement

After finalisation of the individual modules, these will be peer reviewed and the material refined based on feedback. Each module will need at least one review from another consortium partner.

The peer review should ensure that material is not duplicated and that the material has a uniform standard and level throughout the course.

2.2 Course refinement and translation

During and after the initial trial run of the course, students will evaluate the material produced and give feedback to the individual modules and lectures.

2.2.1 Adaptation based on feedback

Based on student feedback and general evaluation of the material, an adaptation will have to take place to improve and adapt the teaching material for the second run.

2.2.2 Translation of material

Translation of the material will only take place after the first round of adaptation, in order to avoid unnecessary double translations.

2.2.3 Transfer to Net-tools platform

In parallel with the other activities the course will be transferred and adapted to the Net-tools platform, where it will live also after the project expires.

2.3 Teaching material adaptation to other contexts

Based on input from WP 4 (CPD) individual modules will be adapted for vocational training needs.

The individual modules can be used stand alone, for shorter courses, with slight adaptation to continuing education and as introductory to post graduate students.

Which modules to adapt will be determined based on the feedback from the associated network and questionnaire results.