O1- Learning objectives and curriculum

T2 - Definition of methodology and learning approach

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C o p y r i g h t

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Avaca Technologies Consulting, Informatics AE

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Kecskeméti Szakképzési Centrum Kandó Kálmán Szakközépiskolája és Szakiskolája

Servicios Extremeños Enseña S.L.

C-Evil – Chargers of Electric Vehicles in Learning
Project number: 2019-1-HU01-KA202-060906

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1 – Introduction

The objective of C-Evil project is to develop new learning and training materials on EV chargers in order to fill the gap in electricity education due to the sufficient and efficient multiplying activities. The growing number of electric vehicles needs more and more EV chargers which require adequate electricity professionals who can install, operate and maintain the equipment properly. Expert partners will provide a special knowledge that can be taught to electricians or future professionals (VET students). Together with the VET partners, they will elaborate materials that can be used anywhere in the EU.

The materials will cover the main areas connected to EV chargers such as charger types, electrical connections, licencing and permitting, installation, electricity standards, management, maintenance and error maintenance. We will put special focus on not only the hardware part of the EV chargers, but also on its software features, i.e. smart management applications. We would like to also highlight in the materials that, even though, there are general information that is valid everywhere, there are also rules and specifications that are different in every country. Country-specified information will be available which will make the materials more thorough.

In order to help understanding the terminology in the different languages, and to facilitate the employment in the EU, a glossary will be set up with the most important terminology in the project partners' languages.

Four intellectual outputs of the C-Evil project will be built upon each other. O1 will provide a solid base for the further activities of the project by defining the learning objectives (O1-T1), methodology and approach (O1-T2), and also developing the EV charger curriculum (O1-T3).

Based on the O1, the partnership will elaborate the content of the training materials (O2-T1). In further tasks of the O2, methodology of trainers' assessment (O2-T2) will be described, and trainers' feedback on the training materials will be collected (O2-T3).

O3 will include the elaboration of the learning materials (O3-T1) which will be the adaptation of the training materials in a student- and user-friendly way. Students will evaluate the learning materials (O3-T4) which requires a description of evaluation methodology (O3-T2). This IO will involve the development of the online learning space (O3-T3) where learning materials will be available for e-learning purposes.

For enhancing the spread and the adaptation of the project results, in O4, project partners will prepare guidelines and handbooks for the most important stakeholders: VET institutions (O4-T1), VET trainers (O4-T2), e-learners (O4-T3) and policy makers (O4-T4).

The partners are committed to disseminate the project results during and even after the project closure, through their daily activity. The outputs will be available on the project's platform, thus, it can be used for future projects and for further educational purposes.

Duration: 24 months

CAM is a micro-sized enterprise in Hungary, acting as lead partner of C-Evil. CAM as an expert organisation has great experiences in the field of electric mobility and in international co-operation covering professional and financial management.

The Turkish EGE University offers courses, inter alia, in the field of electrical-electronics engineering, their experts have expertise and experience related to electric mobility, especially chargers.

The Hungarian VET school, Kecskeméti Szakképzési Centrum Kandó Kálmán Szakgimnáziuma és Szakközépiskolája offers, among others, trainings for electricians. They have professional project experience in an electric car battery project.

The Romanian Colegiul Stefan Odobleja offers a wide range of qualifications in the field of, among others, mechanics and electronics, focusing on providing practical trainings to students. Automotive industry has a priority in their trainings.

Servicios Extremeños Enseña is a Spanish training center providing high-quality educational service. The institution also has experience in training material development and widespread partners to reach out to, including Spanish VET schools.

Learning Hub Friesland is a Dutch NGO enabling, driving and maximizing innovation in education in Friesland. They have experiences in training programme and training material development, organizing workshop and seminars and they have a broad network in the field of education, social sector, industry and governmental.

The Italian-Slovak Chamber of Commerce is an NGO with wide range of partner network. In C-Evil, they will ensure the representation of the labour market, and they can contribute significantly to the dissemination purposes.

Avaca Technologies is a Greek IT expert who has the required expertise for developing the project platform and also has many experiences in international projects on education.

2 - Context

2.1 Description of the Output 'O1- Learning objectives and curriculum'

In order to have a complex and thorough training material on EV chargers, articulating the learning objectives and creating instructional strategies are necessary. Partners will identify and define the desired and expected skills, competences and knowledge that will be developed in the project. VET training methods will be examined in order to ensure the optimal learning approach of the EV charger training material.

- **Task 1) definition of learning objectives.**
  Firstly, learning objectives will be defined based on the VET partners' expectations and the objective pursued, and also on which skills and competences electricians and VET students as future professionals can gain with this material. *See next paragraph for the outcomes of this task.*

- **Task 2) definition of learning methodology and approach**
  After that, learning objectives will lead to defining the learning methodology and approach which will support achieving the goals the mostly. Set of learning activities will be defined for supporting students and e-learners in order to obtain the knowledge entirely.

- **Task 3) the EV charger curriculum.**
  Lastly, O1 will include the EV charger curriculum, as well. Our goal is to provide a special knowledge on EV chargers, with a special focus on their installation and maintenance, which can be available and useable anywhere in Europe: in VET institutions and also in the form of e-learning. We will put emphasize on, besides providing unified training materials, detecting country-specific differences. Such differences can be connected to, inter alia, national legislation, local rules and regulations, technical specifications of the electrical grid or safety standards.

2.2 Summary of the outcomes of task O1-A1

Based on partners research executed in the first task of this intellectual Output, the following general learning objectives and subobjectives were defined, to enable electricians and VET students as future professionals to gain skills and competences with the C-Evil learning materials:

1

To provide students with specific knowledge that will enable them to handle EV Chargers

- To increase students' skills regarding reading, understanding and interpreting electric plans, and technical descriptions and EV chargers' terminology.
- To improve students' IT basic skills.
- To get students acquainted to basic economics: cost/benefit analysis for the client; analysis of costs related to acquiring and installing, costs related to maintenance.
- To provide students with knowledge on legislation, norms and standards that affect EV chargers, their installation and maintenance, electric shock protection.
- To get students acquainted with electric control measurements and tests, troubleshooting and maintenance of electric equipment.
- To teach students how to install and connect electrical equipment.

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2

To develop students' **personal/ professional skills and competences**

- ability to apply knowledge,
- reading comprehension,
- communication skills (both speaking and written),
- organizational skill,
- decision-making skill,
- troubleshooting,
- time management
- problem solving
- flexibility
- dependability
- interpersonal skills (with employer and clients, and among co-workers)
- developing the participants' skills on finding and interpreting information and regulations relating to the installation and maintenance requirements of EV chargers (information processing capability in short).

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In addition, the partners defined a set of extra general objectives of the training materials to be developed.

- To develop training materials (4-5 modules, including video tutorials) and assessment methods and tools.
- To take the necessary steps to have EV chargers included in the national curriculum.
- To train specialists in the area among teachers.
- To make use of European instruments to recognize and validate the learning results.
- To enhance cooperation with local or national entrepreneurs in order to create a common framework.

Details on the subobjectives of abovementioned objectives are listed in O1-T1.

3 - Description of Task O1-T2

Now, it's the matter to investigate how the consortium will make sure the students obtain the learning objectives as described above, the central question if this task is: "*How do students learn best bout electric vehicle chargers?*" In other words: What is our definition of the C-Evil methodology and learning approach?

> *"How do students learn best about electric vehicle chargers?"*

In order to answer this central question and define the learning methodology and approach, all partner will answer a set of questions to define the learning activities that will help students and e-learners better understand the materials and achieve the objectives.

All project partners will summarize at least 3 potential techniques, activities or related digital tools which could be used for or included in the materials. In addition, in order to determine what kind of activities and what learning approach would be appropriate for the C-Evil learning outcomes, partners will answer general questions about VET student learning.

2.1 General questions

- What is your vision on the form in which Vocational students learn best? E.g. obtaining theoretical knowledge (self-study or teacher giving classes), Learning by doing, Online learning / offline learning / blended learning, Working on real life examples / cooperation with world of work / industry, etc.

- What are your expectation towards the e-learning platform and any visuals we want to make in the project?

- For VET partners in the consortium: How do you envision the integration of the learning materials in your school? How much 'space' is there in the curriculum? Are teachers free to integrate innovative learning approaches (such as the C-Evil approach) in the curriculum?

- For VET partners in the consortium: What kind of methods do you use to assess and evaluate if the VET students have acquired the skills and competences?

2.2 Best practise activities / techniques / tools

- What are best practise techniques which could be of added value to the C-Evil learning materials?
    - Which part do you especially find appropriate for C-Evil?
    - Link to the materials or reference where it is uploaded on the Dropbox folder:

4 - Findings

1. What is your vision on the form in which Vocational students learn best?

- Blended learning. A mix of:
    - Theoretical materials including real life examples from industry (videos, animation and photos).
    - Distance learning where self-study is supported by digital tools (Covid-19!)
    - Practical training, through simulations.
- Meet experts working in the field (guest lectures and site visits)
- Circular learning approach (Kolbs model of experimental learning)

2. What are your expectations towards the e-learning platform?

- Simple and self-explanatory, short and concise.
- Materials to be read online and downloadable in pdf.
- Lots of visuals. E.g. videos, infographics, icons, photos.
- Registered using: Profile, automatic emails, dashboard with status, discussion forum between students and trainer, etc.
- Online tests with immediate evaluation.
- Summary after each chapter

3. How do you envision the integration of the learning materials in your school?

TR: teachers can include C-Evil approach in their courses.

- Distance Learning Center –EGESEM- may introduce the course as a part of VET learning certificate programme.

RO: teachers can include C-Evil in „Curriculum for Local Development (CDL)"

- Good cooperation with local entrepreneurs is very important.

HU: 10% of 'space' for local vocational needs that can include C-Evil approach

- But structure of VET will change. Expectation is that C-Evil curriculum can be integrated into our electrician training, mainly focusing on maintenance.

4. What are best practice which could be of added value to the C-Evil learning materials?

- Coursera: https://www.coursera.org/
- Ecotextyle: http://ecotextyle.fantasive.com/
- Circular Quarters: http://www.circulairkwartier.nl

- Kolb model: https://boomberoepsonderwijs.nl/praktische-tips-effectiever-leren-met-de-leerstijlen-van-kolb/
- Creating an interactive video: https://www.youtube.com/watch?v=sjnkHcKL9sw
- 30 Practical examples of interactive video: https://www.youtube.com/watch?v=O1KuDETLqVw
- Simulation of EV batteries: http://www.eth.ieeia.tuiasi.ro/index.php/personal/adrian-munteanu/laboratoare-adrian-munteanu/ and http://www.euedia.tuiasi.ro/?page_id=1185&lang=ro)
- Example of interaction between students of University of York: https://discordapp.com/invite/HGECt3t and https://www.reddit.com/r/yorku/
- Videos on Youtube: Electric Vehicle Charging: https://www.youtube.com/watch?v=bFd2UrfD2ml and https://www.youtube.com/watch?v=ZQBt_ptXkac
- Impacto Ambiental: https://www.fundacionendesa.org/es/recursos/a201909-impacto-ambiental

Annex A – Survey template

GENERAL

1. What is your vision on the form in which Vocational students learn best? E.g. obtaining theoretical knowledge (self-study or teacher giving classes), Learning by doing, Online learning / off line learning / blended learning, Working on real life examples / cooperation with world of work / industry, etc.	
2 What are your expectation towards the e-learning platform and any visuals we want to make in the project?	
3. For VET partners in the consortium: How do you envision the integration of the learning materials in your school? How much 'space' is there in the curriculum? Are teachers free to integrate innovative learning approaches (such as the C-Evil approach) in the curriculum?	
4. For VET partners in the consortium: What kind of methods do you use to assess and evaluate if the VET students have acquired the skills and competences?	

BEST PRACTISE (techniques/activities/digital tools) 1

What are best practises which could be of added value to the C-Evil learning materials? Please include a brief description.	
Which part do you especially find appropriate for C-Evil?	
Link to the materials: (external or upload to the designated folder in Dropbox, under O1-A2-Research Phase)	

BEST PRACTISE (techniques/activities/digital tools) 2

What are best practise which could be of added value to the C-Evil learning materials? Please include a brief description.	
Which part do you especially find appropriate for C-Evil?	
Link to the materials: (external or upload to the designated folder in Dropbox, under O1-A2-Research Phase)	

BEST PRACTISE (techniques/activities/digital tools) 3

What are best practise which could be of added value to the C-Evil learning materials? Please include a brief description.	
Which part do you especially find appropriate for C-Evil?	
Link to the materials: (external or upload to the designated folder in Dropbox, under O1-A2-Research Phase)	