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IO5 – ELIC EVALUATION PROCESS

ELIC

Engineering Literacy Online - Teachers as Medium for Change

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CRAMARS

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1. Description of IO5 - ELIC Transferability and Evaluation Handbook

The main goal of ELIC is to develop a specific training on technical didactics by means of a MOOC for secondary natural sciences school teachers that is attractive, appealing, motivating and of highest quality, thus sustainable and transferable. Once well-trained and armed with powerful resources, secondary natural sciences teachers will have the chance to apply their new and improved competences directly in their daily work during natural science classes to increase pupils´ interest in engineering.

First step of the ELIC transferability handbook will be an improvement catalogue that provides first of all lessons learnt and the applicability of the implemented MOOC (online training).

In a second step it gives advice and instructions on how to multiply the trainings in other countries and/or by other institutions.

AIMS of the transferability and evaluation handbook:

- To evaluate ELIC´s core products and improve them
- To develop a transferability option for other countries after the end of the project
- To increase the knowledge on engineering and technical didactics in other countries and for further stakeholders

Activities / Results:

- Definition of evaluation and transferability criteria
- Design of the evaluation process and transferability guide
- Description of the evaluation tools and methods
- Completion of the transferability guide
- Translation of transferability guide

Lead Partner: Cramars

2. Overview of the MOOC

WHAT TO LEARN

The Engineering Literacy (ELIC) MOOC is an open educational resource (OER) aimed at secondary school teachers of science, technology, engineering and mathematics (STEM) subjects. This MOOC provides a didactical and content toolbox for teachers which should help them to develop an engineering mindset amongst pupils aged 15-18 and increase their interest in engineering professions. Examples and experiments taken from automotive engineering are linked to content from different STEM subjects to show how knowledge of natural and technical sciences can be applied to real-world engineering problems.

This course consists of 6 modules and will run over a 6-week period. Each week, the facilitators will provide learning materials and tasks (e-tivities). The moderators or conveners will monitor the online learning process and actively support learners.

Week 1: Introduction to the MOOC and Engineering Literacy

Week 2: Battery & Light Systems

Week 3: Combustion Engine at a Glance

Week 4: E-Motor – the future of the automotive industry?

Week 5: Hot topics in Engineering – What is new and challenging for the industry?

Week 6: Recap and certification – was it worth participating in the ELIC MOOC?

3. Definition of evaluation and transferability criteria

a. Evaluation criteria (Quality Standards)

The purpose for managing quality is to validate that the project deliverables will be completed with an acceptable level of quality. Quality management assures the quality of the project deliverable and the quality of the processes used to manage and create the deliverables. Table 1 summarises differences between quality control and assurance.

	Quality Control (QC)	**Quality Assurance (QA)**
Definition	QC is a set of activities for ensuring quality in products. The activities focus on identifying weaknesses/mistakes in the actual outputs produced.	QA is a set of activities for ensuring quality in the processes by which outputs are developed
Focus on	QC aims to identify (and correct) weaknesses or mistakes in the finished product. Quality control, therefore, is a reactive process.	QA aims to prevent defects with a focus on the process used to make the output. It is a proactive quality process.
Goal	The goal of QC is to identify weaknesses/mistakes after an output is developed and before it's released.	The goal of QA is to improve development and test processes so that weaknesses do not arise when the output is being developed
Responsibility	Quality control is usually the responsibility of a specific reviewer who checks the output on the basis of a given set of standards.	Everyone on the team involved in developing the product is responsible for quality assurance.

Table 1. Quality Control and Quality Assurance

Description of the Quality components:

Output General Quality Standards	The quality standards that are the "measures" used to determine a quality compliant output; these are defined by the consortium, and are usually at least: - Completeness; - Consistency with the planned work and expected outcome; - Readiness; - Language appropriateness Additional quality standards can be related to specific features of the output.
Process Quality Standards	The quality standards that are the "measures" used to determine if work processes are being followed.
Stakeholder Expectations	Stakeholder expectations describe when a project process is effective as defined by the project stakeholders.
Quality Control Activities	The quality control activities that monitor and verify that the project outputs meet defined quality standards.
Quality Assurance Activities	The quality assurance activities that monitor and verify that the processes used to manage and create the outputs are followed and are effective.

Table 2. Quality Components Description

b. Transferability criteria

Quality control monitors project MOOC to verify that the deliverable is of acceptable compliance with given standards.

As general quality standards, the following will be applied to MOOC delivery:

- Provision of document summary/introduction;
- ELIC format standards compliance;
- Acceptable language, grammar and spelling;
- Objective of the output covered;
- Acceptable quality of text (organisation, structure, diagrams etc.);
- Coverage of expected work;
- Comprehensiveness (no missing sections, missing references, unexplained arguments);
- Usability (output is clear and provided in a form that is useful to the reader).

As regard to output-specific quality standards, table 3 identifies:

- The quality standards established for the MOOC.
- The quality control activities that will be executed to monitor the quality of the output.
- The frequency or the deadline for the quality control activity.
- The partner in charge

MOOC	Specific Quality Standards	Quality Control Activity	Frequency/Deadline	Partner in Charge
MOOC Guidelines to the platform	- Clear presentation of the structure - Easiness of use	Peer review	By 10 days after the final draft delivery	Cramars
MOOC Training curriculum + skill card	- Learning approach respected - Standards' description respected (e.g. learning outcomes approach)	Peer review	By 10 days after the reports delivery	FHJ
MOOC Learning materials	- Consistency of materials with the adopted learning approach (content and media) - Usability of learning materials	Peer review	By 10 days after delivery	Week 1 – HSD Week 2 – TUO Week 3 – HSD Week 4 – ISCN Week 5 – FHJ Week 6 – TUO
MOOC Virtual platform	- Easiness of use - Usability - Multilingualism	External feedback (sample of users)	By 10 days after the final draft delivery	Cramars - FHJ
MOOC Learning piloting	- Adaptation to different contexts and organizational settings	External feedback (sample of users)	By 10 days after the final draft delivery	Cramars - FHJ
Final ELIC conference	- Active participation	Feedback collection	By 10 days after the final draft delivery	FHJ
MOOC organizational issues	- Experiences in reaching out target groups - Time management - Facing special needs	Partners feedback (facilitators and moderators)	At the end of the Piloting phase	Cramars
MOOC future implementation	- Clear presentation of contents - Easiness of use - Effectiveness of contents - Expectations met - Achievement of learning outcomes	Partners feedback (facilitators and moderators)	By 10 days after the final draft delivery	Cramars

Table 3. Output-specific quality standards and their implementation

4. Description of the evaluation tools and methods

The focus of quality assurance is on the processes to implement and disseminate ELIC MOOC. Quality assurance ensures that project processes are used effectively to produce a quality project deliverable.

The following table identifies:

- The MOOC processes subject to quality assurance.
- The quality standards and stakeholder expectations for that process.
- The quality assurance activity – such as a quality audit or reviews - that will be executed to monitor that project processes are properly followed.
- How often or when the quality assurance activity will be performed.

MOOC Process	Process Quality Standards	Stakeholders Expectation	Quality Assurance Activity	Frequency
Respect of internal deadlines	Intermediate and final outputs delivered as agreed	N/A	Monitoring	According to the work plan
Dissemination of MOOC concept	Agreement on the message All partners can provide evidence of dissemination	Information on MOOC concept	Monitoring	According to dissemination plan
E5-E7	Active participation of attendants promoted	Active participation Feedbacks taken into consideration	Evaluation and feedback questionnaire	During the Event
E8 – Final Conference	Active participation of attendants promoted	Active participation Feedbacks taken into consideration	Evaluation and feedback questionnaire	During the Event
MOOC course	--	Feedbacks from users	Feedback collection	During the piloting, according to piloting protocol

MOOC Process	Process Quality Standards	Stakeholders Expectation	Quality Assurance Activity	Frequency
MOOC organizational issues and lessons learned	Experiences in reaching out target groups Facing special needs	Partners feedback	Feedback collection	At the end of the Piloting phase

Table 4. Quality Assurance processes and their implementation

a. Evaluation Methods

To implement the evaluation, we will use a recursive process of collecting qualitative data, reflection and (potential) re-planning, that will take place all over the output lifespan.
For the evaluation of MOOC, different tools will be used according to the target groups addressed and to the processes in place. At the present stage of development, the following tools are expected to be used:

- Internal Peer Reviews: this exercise will be carried out within the consortium, and will contribute to quality assurance purposes;
- Feedback collection: from project partners related to internal issues and problems faced to develop the MOOC and its piloting;
- Feedback collection: administered by project partners, to beneficiaries at different stages of the MOOC;
- Feedback collection: administered by project partners, to participants to Events disseminating the MOOC and final project results; E5 – E7
- Stakeholder analysis and involvement: administrated by project partners will contribute to the project sustainability after its end

It should be stressed that additional and/or different tools can be used according to detected needs during the MOOC implementation, in order to ensure flexibility and efficacy of the evaluation exercises.

b. Evaluation Tools

The following table lists the tools to be used to support quality management implementation and the purpose or use of the tool.

Tool Name	Tool Purpose/Use
Quality Matrix	Template to be filled by appointed reviewer(s) for quality control of each deliverable
MOOC Guidelines to the platform matrix	Template to be filled by internal reviewers
MOOC Training curriculum + skill card matrix	Template to be filled by internal reviewers
MOOC Learning materials quality control matrix	Template to be filled by internal reviewers + direct review of contents to be uploaded on google drive by reviewers
Peer and external review MOOC learning piloting	Template that collects feedbacks final beneficiaries and peers.

Quality assurance event 5-7 matrix and final conference	Template to be filled by participant to events
Internal review of ELIC MOOC – management and organizational issues and future implementation	Template to be filled by facilitators and moderators following a defined structure
Stakeholder analysis and involvement	Template that collects data and availability

Table 5. Quality tools

5. Structure proposal of the transferability guide

The Transferability and Evaluation Handbook will provide first of all lessons learnt and the applicability of the implemented MOOC (online training). Then will give advice and instructions on how to multiply the trainings in other countries and/or by other institutions. Follows the proposed structure to be implemented:

- Presentation
- Project Framework
    - Background
    - Why ELIC project
    - Objectives
- ELIC Learning resources
    - ELIC MOOC description
    - Target groups
    - Expected outcomes
    - Learning resources provided
- Results of the evaluation
- Lessons learned
- Possibilities to use the MOOC in the classroom
- ELIC Learning platform – MOOC
    - About the platform
    - Quality procedures and guidelines
    - How to transfer the MOOC – pre-conditions
    - How to access the platform
    - Technical support
    - Certification criteria
- Transferability options
    - Stakeholders
    - Follow up activities by partners
    - How to ensure sustainability of the project outcomes?
- ELIC partners and contacts

6. Annexes

Annex 1 Quality Matrix

Quality Control Check	Y/N	Reviewer recommendations/comments
Generic Minimum Quality Standards		
Document Summary/Introduction provided (with adequate synopsis of contents)		
ELIC format standards complied with		
Language, grammar and spelling acceptable		
Quality of text is acceptable (organisation and structure; diagrams; readability)		
Comprehensiveness is acceptable (no missing sections; missing references)		
Usability is acceptable (deliverable provides clear information in a form that is useful to the reader)		
Open comments		
Checklist completed by Name/Partner: *PERSON_NAME, ORGANISATION_NAME* Date: *DD/MM/YYYY* Signature:		

Annex 2 External review MOOC learning piloting

Introduction to the questionnaire or evaluation tool

Background Information:

1. **Gender** Male ☐ Female ☐
2. **Age** **25-35** ☐ **36-45** ☐ **46-55** ☐ **56-65** ☐ **66+** ☐
3. **Country of residence**_____
4. **Affiliation: university/school/ other type of institution**
5. **Subjects taught**
6. **Age-groups taught (select multiple)**

Course evaluation

General

7. **Was the introduction to the MOOC understandable?**

   Yes ☐ No ☐

7.1 If no, please give suggestions for improvements

8. **Is the learning platform (MOOC) easy to access / use?**

Not user-friendly	☐	Somewhat user-friendly	☐
Moderately user-friendly	☐	Very user-friendly	☐
Extremely user-friendly	☐		

9. **Which week(s) did you attend? (multiple selections possible)**

☐ Week 1 ☐ Week 2 ☐ Week 3 ☐ Week 4 ☐ Week 5 ☐ Week 6 ☐ All

10. **How much overall time did you spent on the lessons for the whole course (in hours)?**

☐ From 4 to 10 ☐ From 11 to 20 ☐ From 21 to 30 ☐ From 31 to 40 ☐ From 41 to 50 ☐ More than 50

Overall layout

11. **Circle your response for each item.**

(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5= Strongly agree)

11.1 The layout of the online platform is attractive

1 2 3 4 5

11.2 Navigation is easy and clear.

1 2 3 4 5

11.3 The titles and sequence of modules are well suited for training.

1 2 3 4 5

11.4 The layout is standardized for each module.

1 2 3 4 5

11.5 Comments

12. How user-friendly is the online learning platform?

Not user-friendly	☐	User-friendly	☐
Moderately user-friendly	☐	Very user-friendly	☐
Extremely user-friendly	☐		

13. Did all of the buttons, links, videos, attachments, etc. work properly?

Yes ☐ No ☐

13.1 If no, please indicate what did not work and in which section.

14. Did you encounter any technical problems while using the online learning platform?

Yes ☐ No ☐

14.1 If yes, please indicate what problems you had?

Contents

15. Circle your response for each item.

(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5= Strongly agree)

15.1 The language used is appropriate

1 2 3 4 5

15.2 The language used was easy to understand

1 2 3 4 5

16. Contents and materials: please circle your response for each item.

(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5= Strongly agree)

16.1 The training contents conveyed new creative approaches

1 2 3 4 5

16.2 The content length was suitable

1 2 3 4 5

16.3 The training delivered new knowledge

1 2 3 4 5

16.4 There was content relevant to my teaching subjects

1 2 3 4 5

17. There was a rich variety of material

Yes ☐ No ☐

17.1 If no, how we can improve it, or what is missing?

18. How confident do you feel about using the knowledge, practices and concepts presented in the ELIC training program in your future/current job?
(1=Not confident, 5=Very confident)

1 2 3 4 5

19. How useful do you consider the following elements in helping the learning process? (1= Not useful, 5=very useful)

19.1 Videos
1 2 3 4 5

19.2 Images/graphics
1 2 3 4 5

19.3 Tables
1 2 3 4 5

19.4 Quizzes
1 2 3 4 5

19.5 Recommended readings
1 2 3 4 5

19.6 Activities/Assignments
1 2 3 4 5

20. Which weeks were the most interesting for you? (multiple selections possible)

☐ week 1 ☐ week 2 ☐ week 3 ☐ week 4 ☐ week 5 ☐ week 6

Activities

21. Were the assignments described clearly and easy to understand?

Yes ☐ No ☐

21.1 If no, what difficulties did you have in accomplishing the activities?

22. Which assignments were interesting for you?

23. Which assignments enabled you to better understand the learning material?

23.1 Why?

General feedback

24. In your opinion, are there any topics that require more extensive coverage?

Yes☐ No☐

24.1 If yes, which? (multiple selections possible)

☐ 1 Introduction ☐ 2 E-Motor ☐ 3 Combustion Engines

☐ 4 Battery & Light ☐ 5 Hot Engineering ☐ 6 Recap

24.2 If yes, please give us some suggestions for the implementation

25. In your opinion, is there any subject included that you did not consider so necessary?

Yes ☐ No ☐

25.1 If yes, which? (multiple selections possible)

☐ 1 Introduction ☐ 2 E-Motor ☐ 3 Combustion Engines

☐ 4 Battery & Light ☐ 5 Hot Engineering ☐ 6 Recap

25.2 If yes, please specify why you consider some subjects not so necessary

26. Did you post any teaching ideas / materials to share with other teachers online?

Yes ☐ No ☐

27. Do you feel that the MOOC ELIC is a useful platform for the exchange of teaching ideas / materials to help improve engineering literacies?

Yes ☐ No ☐

28. Did you find the MOOC platform to be a suitable medium for the transfer of knowledge, ideas and/or teaching materials?

Yes ☐ No ☐

Open feedback and your added value

29. What did you learn from this course?

30. How can we improve our training package?

31. Has the ELIC MOOC provided you with ideas / materials that you will be able to use in your classroom?

Yes ☐ No ☐

31.1 If yes, which ones?

32. Which topics provided the best links between the natural sciences and their application in engineering fields in industry?

33. **What topics would you like to see included in any future training courses on engineering literacies?**

34. **How likely is it that you would recommend the training package to a fellow teacher, colleague or friend?**

☐ Extremely unlikely ☐ Unlikely ☐ Neutral
☐ Likely ☐ Extremely likely

35. **What overall grade would you give to the ELIC MOOC?**

☐ Bad ☐ Average ☐ Good
☐ Very good ☐ Excellent

Thank you very much for your collaboration and feedback!

Annex 4 Quality assurance events

ELIC event
Location: <Organisation, Address, Country>
Date: <DD/MM/YY>

FEEDBACK FORM

Please answer the following questions by rating on the available choices	Not at all	Somewhat	Yes	More than expected	Much more than expected
Did the event meet your expectations?					
Do you think you have learnt anything during the event?					
Is the addressed topic relevant to your work/professional life?					

Please rate the quality of the following items	Very poor	Poor	Average	Good	Very good
Information provided before the event					
Materials delivered during the event					
Presentations and speeches					
Facilitation and sharing					

Please rate the following items with regard to present/future perceived usefulness in your professional life (or daily work)	I am not sure	Not useful	Somewhat useful	Quite useful	Very useful
The ELIC project overall					
The discussion during the event					
Sharing with colleagues, with other stakeholders, networking					
Is there anything you do want to add? (e.g. suggestions, proposals, general comments, etc.)					
If you want to be involved on keep informed about the progression of the ELIC project, you can leave your e-mail address here					

Thank you!

Annex 5 Internal review of ELIC MOOC and future implementation

Dear Partners,
As a result of your implementation work in the ELIC Course as facilitator or moderator and to define implement a useful guide for further implementation of a MOOC, we kindly ask you to complete this simple questionnaire and leave your opinion on ELIC MOOC. On behalf of the ELIC Partnership thank you for the participation!
All information provided will remain confidential.

1. What was your role in the MOOC

☐ Facilitator ☐ Moderator

Indicate how satisfied are you with each of the following aspects related to the work done as facilitator or moderator for the ELIC MOOC?

2. Time management

☐ Very satisfied ☐ Satisfied ☐ Uncertain ☐ Dissatisfied ☐ Very dissatisfied

3. Organizational issues

☐ Very satisfied ☐ Satisfied ☐ Uncertain ☐ Dissatisfied ☐ Very dissatisfied

4. Content development or content feedback

☐ Very satisfied ☐ Satisfied ☐ Uncertain ☐ Dissatisfied ☐ Very dissatisfied

5. Reaching the participants

☐ Very satisfied ☐ Satisfied ☐ Uncertain ☐ Dissatisfied ☐ Very dissatisfied

6. Have you encountered some difficulties?

☐ Yes ☐ No

6.1 If yes please describe

7. Having another chance of MOOC development, what would you have done better?

_____

8. What was wrong in your opinion?

_____

9. Please add your comments and feedback

_____

Thank you very much for your kind collaboration!

Annex 6 Stakeholder analysis and involvement

Table of stakeholder analysis

	generalities		*related to the local context*			*related to the project*		strategies to contact and engage	
Stakeholder Name	**Contact Person**	**Description**	**Interest**	**Influence**	**Impact**	**How could the stakeholder contribute to the project?**	**How could the stakeholder develop project results?**	**How to contact the stakeholder**	**Strategy for engaging the stakeholder**
	Phone, Email, Website, Address	***Location, activities, numbers …***	***What is important to the stakeholder?***	***How much influence do they have in the school context? (Low-Medium-High, reasons)***	***How much does the project impact them? (Low-Medium-High, reasons)***				

Table of stakeholder involvement

	data			**outcome**			**contact person for the project**			
number list	**Stakeholder name**	***date***	***contact tool***	***interested? (Y/N)***	**In what?**	***What level of participation?***	***name***	***phone***	***mail address***	***notes***