

Analysis of tools and structure of the content

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Women Power Code

Empowering Women to acquire Digital Skills

Lead Organisation:
CIVIC

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CONTEXT

As per the conclusions of IO1 work, WPC will create an integrated framework to define, prepare, assess and also equip with educational tools adult women and their daughters to acquire and advance their programming skills thus promoting participation of women in the STEM/ICT sector.

The WPC framework involves the dissemination of KEY INTERNET OF THINGS (IoT) CONCEPTS and the elaboration of a new curriculum comprising engaging training material (i.e. text, video tutorials and videogame) under a Social Learning Environment enhancing training and peer-learning. The project beneficiaries will be equipped with new and improved digital skills to contribute to their general living conditions improvement and take up a STEM/ICT-related career

The second Intellectual Output defines the conceptual framework on which the training course and delivery tools of the project will be based. The purpose of IO2 is to define a curriculum for adult women to embrace IoT in their daily lives. This course will be used for the development of interactive multimedia content to support the delivery of the training through a gamified environment promoting social learning principles. The course will also relate to a new expert profile.

The first activity of the output comprised the analysis of the tools to be used for fieldwork research and the identification of the structure of the course content.

The 4 main findings from the desktop research:

1. The constant development of the Internet of Things (IoT) signifies new entrepreneurship possibilities. News ways of doing things have an impact on all aspects of our society and necessitate news knowledge and skills. Ubiquitous content and IoT are an integral part of the society of tomorrow. Adopters will come up with money making ideas or will find ways to make their current business more competitive.
2. 3D Printing and IoT are motivational and effective ways of introducing women and children to coding. Practical applications relating to day to day life and combining the online with the offline world are perfect motivational elements for women and children to embrace coding without increasing screen time but by taking their “craft” outside the screen and into their lives.
3. Women would happily embrace new technologies which can improve their daily lives and/or professional careers but more dedicated community support is needed. This is a key part of the project as it needs to make a difference in providing the support which is actually needed by the

target group and not the support that it is thought that is needed. The early engagement of the target group with the project is key and sustainability should be part of the design of the training content and tools.

4. The Raspberry Pi is the most widely used micro computer today for 3D printing and IoT implementations and comes with a wealth of resources, tools and support for all levels. It is cheap and extremely well supported so that detailed information about anything that one may want to do can be found online. From full support for the creation of retro gaming consoles for reintroducing hands on educational play to children to implementations targeting health, nutrition and other important aspects of our daily lives. The challenge here is to generate awareness and disseminate knowledge about the existing wealth of resources, tools and support and enthusiasm will do the rest.

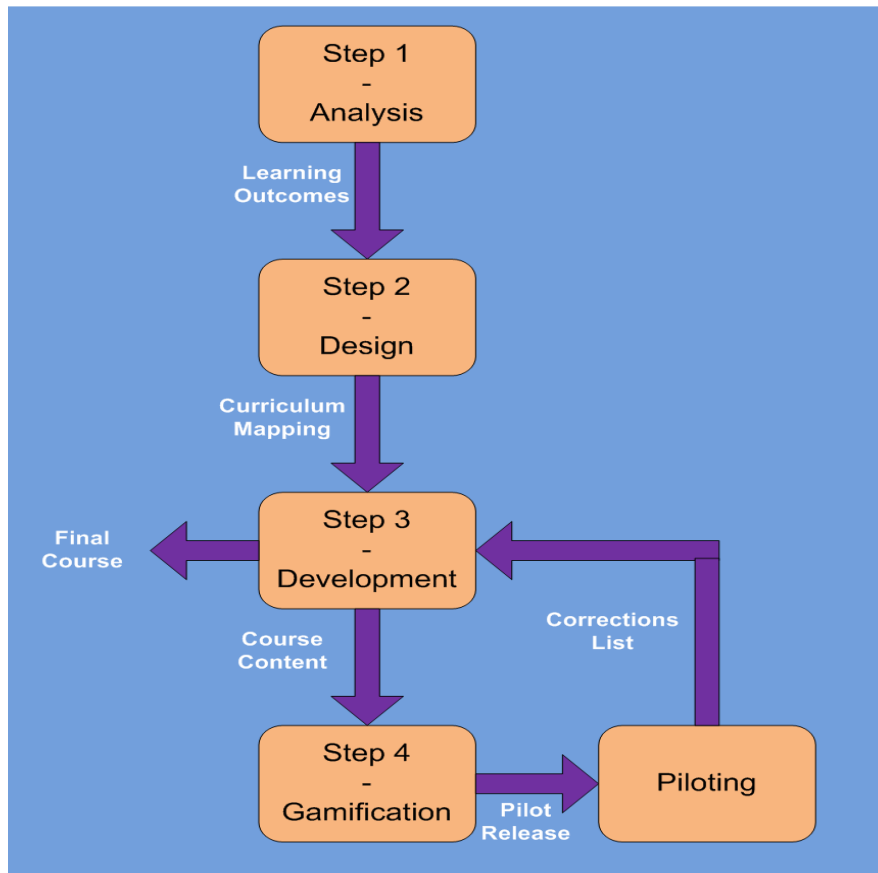
ANALYSIS OF TOOLS

Considering that most of the content exists and is available under open licenses (OER, CC, etc.) while specific primary content will need to be developed in the context of the project to address specific concepts of the program, we consider that **an OBE (Outcomes Based Education) approach is more appropriate for the project.**

By applying the OBE process, we will restructure existing curriculum and assessment practices in order to ensure the **achievement of high quality learning and mastery for the target groups rather than the accumulation of course credits.**

The primary aim of OBE is to facilitate changes of the desired needs of learners, by increasing knowledge, developing skills and/or positively influencing attitudes, values and judgment. OBE embodies the idea that the **best way to learn is to first determine what needs to be achieved.** Once the end goal (outcome) is determined the strategies, processes, techniques, and other ways and means can be put into place to achieve the outcome.

A high level graphical overview of the methodology to be applied, broken down in Steps, is depicted below:



The **first step** in the project methodology is to **determine the Learning Outcomes (LOs) to be achieved within each concept of the WPC program content.**

Definition: Learning Outcomes are clear learning results that learners have to demonstrate at the end of specific learning experiences: what learners can actually do with what they know and have learned. Los can be seen as **actions that embody and reflect learner competence in using content, information, ideas and tools successfully.**

TRAINING CONTENT AND STRUCTURE

We start the process of identification of LOs by answering the following questions in relation to our learners target groups:

1. *How would you describe the attributes of an ideal learner who has completed the program? What unique strengths should learners who complete this program possess?*
2. *What is essential for learners to know and be able to do at the end of their learning experiences?*

What key knowledge, skills and values/attitudes should possess learners who complete the program?

Then, there is a set of **guidelines** which is **used as input** by our curriculum planners in order **to prepare effective LO statements**. These guidelines are **embedded in LO templates** we have designed and which our curriculum planners **use to record the LO statements**. With regards to format, breadth and level of detail typically contained in program level LO statements we prepare, we rely on the most recent research conclusions on preparing effective Learning Outcomes by the University of Guelph in Canada and the guidelines for writing effective LOs by the University of Malta.

The WPC curriculum planners should clearly identify the combined set of outcomes to be demonstrated by the learners from all the target groups at the end of each specific learning time. Following the identification of these outcomes, we enter **step two** of the project methodology, where the **curriculum is designed by reverse engineering, backward mapping of knowledge and skills (curriculum mapping)**. The design process, infers that all the curricular and training activities are conceived by going backwards from the point where the final outcomes should be demonstrated.

Thus, having decided what are the key concepts learners should understand and be able to do or the qualities they should develop, both structures and curricula are designed to achieve those capabilities or qualities.

Based on OBE, the **activities of curriculum development, implementation and evaluation are geared by the outcomes which need to be demonstrated by the learners**.

We now enter **Step three**, where we **develop the content** based on the design of the previous step. The program content is already defined at a high level and comprises two main pillars:

- A. 3D Printing:
 - a. Introduction to 3D printing (what it is about, how it works, how it changes things)
 - b. 3D printers (3D modelling applications, 3D scanners, creating virtual designs of objects, working with virtual designs and 3D printers)
 - c. Practical applications (practical examples including ways to improve our daily lives in our house, at our workplace or in our community)
- B. Internet of Things:
 - a. Introduction to IoT world (what does it mean, key concepts, how it changes ways of doing things, where is it headed)
 - b. Raspberry Pi platform (hardware, software, raspberry based IoT devices, minecraft Pi)
 - c. Practical applications (practical examples including ways to improve our daily lives in our house, at our workplace or in our community)

Two pillars with three modules each, six modules in total

The Learning Outcomes to be demonstrated by the learners have been defined in the first Step in terms

of the concepts under each pillar while the necessary knowledge and skills for demonstrating the outcomes need to be mapped to curricular and training activities per concept or sets of concepts during the second Step.

Thus, in **Step three** partners will **develop the material to be delivered to the learners in support of the Learning Outcomes to be demonstrated.**

The content which will be transcribed and enhanced to support the Learning Outcomes and will be fed into the content development process, will originate mainly from three sources:

1. Existing content provided (database of resources from IO1/A1)
2. Open Educational Resources (OER) from open content repositories selected based on quality and value in terms of supporting the acquisition of the necessary knowledge and skills by the learners
3. Content that domain experts from the partners will develop to enhance/extend content from the 2 previous sources and/or new content developed from scratch to cover additional Learning Outcomes.

The content development process may include the following main activities:

- *Background and descriptive information:*
 - Basis of the curricula (why it was developed)
 - Target audience
 - Other relevant information explaining the material and supporting its use
 - **Resources supporting the content, (e.g. citations, web links, prototype materials, tools, and guidelines)**
 - License information (open) and contact information
- *Directions on how to use the content – Train the Trainers guide:*
 - Guidance on using learning principles
 - Specific tips to improve learning
 - Outcome and competency statements supported
 - Suggestions for presenting the material
- *Course planning forms and checklists:*
 - Materials, equipment, and facility specifications
 - Unit or module overviews with key messages
 - Scope and sequence guidelines, (e.g. sample course outline or agenda with timeframe)
- *Guidance on tailoring each particular workshop so it matches the needs or wants of participants, or fits a program's needs:*
 - Topic-specific materials and questions to help trainers gather needs assessment data from learners
 - Materials may include:
 - Questionnaires or discussion questions for gathering information from potential

- participants before the training
 - Exercises that help participants think about their own learning objectives
 - Pre-tests or activities to determine what participants already know; or what they want to learn
- *Clear and complete course content:*
 - Course outline including content, learning activities, directions, and timeframes
 - Presentation notes with support materials for each session (e.g. PowerPoint, overheads, participant worksheets, and handouts)
 - Important teaching points for the trainer to introduce, discuss, or address
 - **Active learning exercises (e.g. group discussions, case studies, brainstorming, and skills practice) providing opportunities for participants to clarify, question, apply, and consolidate new knowledge**
 - Participant handouts and other course material
 - Accurate and appropriate technical content
 - Ordered content with information moving from basic to specialized, and from simple to complex
 - Participant opportunities for building on what they've previously learned
- *Integrated evaluation plan/tools:*
 - Methodology and tools for assessing participants' learning and progress, (i.e. evaluation)
 - Evaluation questions linked to specific learning objectives.
 - Trainer/facilitator self-evaluation form.

At the end of Step 3, the **Digital content** in open format should be provided in the form of itemized resources which can be adopted in the future and/or use as building blocks for future courses. All artwork and image resources will be also made available to the client under an online repository with a specific album for the project.

The final form of training kit (IO3) will be formed by: about 180 pages of text (6 modules x 30 pages), at least 12 videos (2 videos /module), many images, tables, graphs, diagrams and 6 quizzes.