



R3.2 – Methodology for realizing VET curricula



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Abstract:	In this document entitled "Methodology for realizing VET curricula" provides the main methodology of the Mu.SA project in order to realize the VET curricula, while at a second level provides the methodology adopted for the content production procedure for all components of the VET curricula (MOOC and Specialization Course). It is part of Task 3.2 – Design of VET Methodology. Special emphasis is given to the methodology to produce learning outcomes.
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Abstract

This document entitled “Methodology for realizing VET curricula” provides the main methodology of the Mu.SA project in order to realize the VET curricula, while at a second level it provides the methodology adopted for the content production procedure for all components of the VET curricula (MOOC and Specialization Course). It is part of Task 3.2 – Design of VET Methodology. Special emphasis is given to the methodology to produce learning outcomes.

Initially, reference is made to issues that concern adult education for professional development in section 2, while in section 3 the methodology adopted by the Mu.SA consortium and used throughout the project lifecycle in order to realize the Mu.SA VET curricula is given. Subsequently, section 4 refers to the two-stages training (MOOC and Specialization course) and the methodology adopted in order to develop content for the Mu.SA VET curricula based on learning outcomes (4.1 Instructional design methodology for the Mu.SA MOOC content development and 4.2 Instructional design methodology for the Mu.SA Specialization course content development). Last, the reader may find in the Appendices the set of templates that must be filled in during the methodologies implementation, flowcharts for the appropriate monitoring of the content design and development process, supportive documents to the above methodologies, a manuscript on how to write effective learning outcomes according to Bloom taxonomy and many more.



1 Introduction

This document entitled “Methodology for realizing VET curricula” aims to provide the methodology for VET curricula, with special emphasis to the online learning that will be developed and provided to the public by the Mu.SA project. The reader should keep in mind that Mu.SA employs a staged VET methodology, consisting of a MOOC, a blended learning stage, and a work-based learning component. Therefore, this document provides rich insights for the content design and development, primarily for the MOOC and blended learning course, and secondary for the work-based learning component.

In brief the MOOC is based on a curriculum of 22 competence modules, of 80 hours equivalent of learning. It is delivered in 8 weeks, fully online, with the support of online tutors. The assessment is based on the learning outcomes characterizing the competence modules delivered, and is conducted online through multiple choice assessment quizzes.

Subsequently, the Mu.SA Specialization Course is a 24 week course, including face-to-face (around 24 hours), online (around 130 hours¹) and work-based (around 205 hours) learning, with a total study and practice load of around 384 hours, delivering a specialized set of digital and transferable competences.

The online learning component of the course is based on a curriculum of 22 - 26 competence modules (depending on the VET curricula), delivered fully online, with the support of online tutors. The face-to-face learning sessions is used to enhance collaborative learning, solve questions, and implement case studies and group learning. The work-based learning is conducted by the learner in a museum or cultural organization, based on pre-defined and agreed learning activities characterized by their own learning outcomes, as an implementation of the competence modules (online learning).

¹ The specialization course includes an online learning stage of around 130 hours (learning equivalent) per job role profile (VET curricula). The sum of the online learning competences delivered to the all four VET curricula by the Mu.SA consortium is 360 hours (learning equivalent).

The assessment of the online learning is based on the learning outcomes characterizing the competence modules delivered, and is conducted online through multiple choice assessment quizzes and graded practical assignments. The assessment of the work-based learning is conducted through a WBL report and a WBL presentation based on predefined standards.

The training program, aggregately, has a learning duration of 464 hours. The 259 hours (around 56% of the duration) is delivered online and face-to-face, whereas the 205 hours (around 44% of the duration) considered work-based learning. These numbers include both the MOOC and the specialization course.

In the rest of this document, Section 3 refers to the methodology adopted by the Mu.SA consortium and used throughout the project lifecycle in order to realize the Mu.SA VET curricula. Subsequently, section 4 refers to the two-stages training (MOOC and Specialization course) and the methodology adopted in order to develop content for the Mu.SA VET curricula based on learning outcomes according to the Bloom Taxonomy², and are described in details in 4.1 Instructional design methodology for the Mu.SA MOOC content development and 4.2 Instructional design methodology for the Mu.SA Specialization course content development. Last, the reader may find in the Appendices the set of templates that must be filled in during the methodologies implementation, flowcharts for the appropriate monitoring of the content design and development process, supportive documents to the above methodologies, a manuscript on how to write effective learning outcomes according to Bloom taxonomy and many more.

² Bloom, B.S. (1956). Taxonomy of educational objectives: The classification of educational goals. New York, NY: Longmans, Green.



2 Adult education for professional development

2.1 Adult education

As constituted primary by Malcolm Knowles in the 1970s with the term andragogy³, and has been documented by a number of research results^{4,5}, adults learn differently from younger students. Adults have special needs as learners and these needs should be taken into consideration when planning training for adults. Therefore a number of assumptions about adult learning are identified: need to know, self-concept, prior experience, readiness to learn, learning orientation, and motivation to learn.

Therefore the Mu.SA consortium took into consideration all the above assumptions in order to realize the methodology for Mu.SA VET curricula and considered them in the design of the VET curricula and in the learning process as follows:

Adults are internally motivated and self-directed

Adults believe they are responsible for their lives. They need to be seen and treated as capable and self-directed. The most potent motivators are internal (e.g., desire for increased job satisfaction, self-esteem) and the design of the learning material and process should be aware of it.

Adults bring life experiences and knowledge to learning experiences

Adults come into a learning activity with different prior experiences. There are differences in background, learning style, motivation, needs, interests, and goals. Adults also learn better if the teaching

³ Knowles, M. S., Swanson, R. A., & Holton, E. F. III (2005). The adult learner: The definitive classic in adult education and human resource development (6th ed.). California: Elsevier Science and Technology Books.

⁴ Posted by Darlo ON NOVEMBER 03, 2016, <https://darlohighereducation.com/news/malcolmknowles6adultlearningprinciples/>

⁵ Ota, C., DiCarlo, C.F., Burts, D.C., Laird, R., & Gioe, C. 'Training and the Needs of Adult Learners, *Journal of Extension (JOE)*, December 2006, Volume 44 (6)



is focused on problems to be solved rather than content to be memorized, creating a greater need for differentiation in teaching and learning techniques used (discussions, simulations, problem-solving activities, or case methods).

In line with the above emphasis in adult education, additional attention should be given on the learning techniques that take into consideration the experience of learners, such as group discussion, problem-solving, case methods, simulation exercises, games, and role-play, instead of using solely transmittal techniques such as lecture. Of course, using a combination of these teaching strategies will have the greatest impact.

Adults are goal oriented

Adults become ready to learn things they need to know and do in order to cope effectively with real-life situations. Adult learners have the intention to acquire relevant and adequate knowledge and want to learn what they can apply in the present, and the most important want to know why they need to learn something before undertaking learning. For these reasons the learning objectives and the intended learning outcomes should be clearly identified in all learning components.

Adults are practical

It is very important for educators to identify appropriate ways and convert theoretical learning to practical activities. Work placement (work-based learning) is a way for adult learners to apply the theoretical concepts they learned inside the classroom or online into real-life situations. Learning is assisted when appropriate ways of implementing theoretical knowledge in real life situations is made clear.



2.2 Types of learning

We are used to the idea that formal learning in school, university or any formal course is the only valuable learning.

Formal Learning is part of a prescribed course of subjects and learning objects that form a curriculum with specific learning outcomes that students should achieve.

Non-Formal learning is not part of the curriculum or the main syllabus but have some learning structure and maybe some assessed outcomes. Examples might be painting lessons, archeological sites guide lessons, cooking lessons or sports coaching, community or non-credit adult education courses, professional conference style seminars, and continuing professional development. The learner's objectives may be to increase skills and knowledge, as well as to experience the emotional rewards associated with increased love for a subject or increased passion for learning.

Informal Learning is very difficult to assess but it is the learning we do every day. Informal Learning is generally viewed to be something one discovers or learns as a part of everyday activities.

Because we can find good information on the internet and we need to constantly develop new skills and competencies people are learning things all the time.

Of course, Non Formal courses exist with MOOCS and other forms of online learning and some even carry some form of accreditation.

The reason for doing so much Informal learning which is not recorded (in the most of the cases) is because we prefer it and this is because: Informal learning is flexible and it can suit one's mood and the way s/he wants to learn. It can be done when and where s/he wants and most importantly, as whenever s/he wants.

2.3 70-20-10

The 70-20-10 Model for Learning and Development is commonly used in business training. The model was created in the 1980s by Morgan McCall, Michael M. Lombardo and Robert A. Eichinger⁶, when they were researching the key developmental experiences of successful managers.

According to them, adults gain their knowledge from different sources. The 70% of the knowledge gained enhanced through job-related experiences, another 20% by improving their experiences through interaction with others whilst the last 10% gained via formal training.

To be more specific, the 70 per cent is thought to be the most beneficial for employees because it enables them to discover and refine their job-related skills, by making mistakes in context and interacting with other people in work settings. The knowledge gained by job-related experiences is the most beneficial for a person. Employers increase their working skills, learn how to make decisions while addressing challenges, and enhance their communicative skills via their daily interaction with their mentors and co-workers. They also learn from their mistakes and receive immediate feedback on their performance.

Learning from others is the 20 per cent through social learning, coaching, mentoring and collaborative learning and other methods of interaction with peers. Encouragement and feedback are the main benefits of this approach.

Only 10 per cent of development comes from formal instruction and other training events.

Taking everything into account, the model of 70/20/10 is extensively applied due to the easy access to a variety of high-quality learning materials that exist which in part is free. Web-based portals and data – sharing platforms (as the YouTube), are major used to train companies' employers.



In the case of Mu.SA, the aforementioned model was slightly changed for two reasons; first, the learners were mostly working adults, therefore the work-based learning experiences (i.e. the 70%) should be decreased and supported extensively by the online learning component. Second, based on the results of the identification of training needs and the extensive proliferation of contemporary technologies, theoretical knowledge with specific practical exercises (practical assignments) was selected as the ideal component. Therefore, the rule applied in practice was formulated to 45-10-45. This was a scientifically justified decision of the Mu.SA consortium.

The MuSA consortium adopted all three types of learning (formal, non- formal and informal) through a staged approach that combines MOOC, elearning, face to face training and work based learning.

In detail, the Mu.SA project focused to the development of museum and cultural organization professionals, decided to follow a blended learning approach; this decision was taken in order to

(a) respect the fact that (candidate) learners were working adults, many of them with family obligations and heavy work duties, therefore they should be supported to learn on their own pace; in this regard, an extensive online learning approach should be followed and stressed as much as possible.

(b) in the same time, the (candidate) learners should be engaged in face-to-face sessions, in order to implement group learning, facilitate the problem solving, and connect with their peers.

(c) and last, the practical application of the newly acquired knowledge was more than essential, in order to perform effectively and efficiently in their (newly defined) working (job) role, and in the context of a “real” organization, i.e. a museum or a cultural organization.

(d) this effort should be supported by tutors, in order to facilitate learning and solve the queries of the learners.

The main task of the tutor (no matter if it is a tutor of a competence or a supervisor in work-based learning) will be to monitor the



development of the activities, so that the learning and engagement of the learner proceeds in an integrated and harmonious way.

The order and alternation within the blended learning activities are defined in the training program and agreed between the VET provider and the social partners.

On the other hand, the Mu.SA platform includes a variety of learning materials and practical assignments, divided into competences, designed wisely for the distance learning part of training, providing to the tutors and the learners content and pre-defined tools enhancing their collaboration, skills and competences development, and peer learning overall.

The most challenging tutoring goal in a blended learning path is the integration of activities performed in presence and at a distance, in order to obtain the desired results.

Tutoring should be done at three levels:

- a) individual participants
- b) groups of participants
- c) the VET curricula

Working with **individual participants** should build upon the knowledge and relationship developed with them. The tutor supports the participant by facilitating the use of online resources and classroom activities; helps him/her to reflect on the experiences made; helps him/her to connect the new contents learned with his/her previous experience (this scaffolding action is crucial with adult learners); facilitates the participant's relations with the peer group; and finally, the tutor is the natural interface with the organisations (Mu.SA partnership, local VET provider, social partners) that provide the training.

When working with **groups**, tutoring should accelerate the transformation of the group's participants into a learning community. In a social learning perspective, tutoring promotes collaboration among the participants and facilitates the development of peer consulting and peer support relationships

among them. The tutor also controls and encourages participation in distance activities involving peer sharing and collaboration.

In the delivery of the **training course**, the tutor collaborates in the didactic planning; gives his/her opinion on contents and verification tests; guarantees the usability of the resources dedicated to distance learning, and manages the transition from presence to distance.

Teaching

Teaching is the didactic-specialist function of delivering technical disciplinary content.

In the blended learning context designed by the Mu.SA project, teaching entails delivering lessons in presence and at a distance by using the online resources available on the Mu.SA platform, but also preparing or overviewing the production of additional digital learning materials such as learning objects (LOs), conditional Moodle lessons, readings, exercises. Teachers also develop the practical assignments, promote and monitor their delivery and assess (grade) their outcomes.

The functions described above are contiguous and complementary. In short, facilitation starts the dialogue with and support process of the participant; tutoring continues this process and oversees the whole didactic process; teaching is devoted to content delivery and assessment.

Technical and other support tools for blended learning

As already anticipated, the main technological resource in Mu.SA is the Mu.SA Moodle platform (separate platform for the MOOC and the specialization course) that allows to manage and deliver a range of online resources and activities designed to be carried out at a distance or in the classroom, at individual and group level, in both synchronous and asynchronous modes.

Participants access the platform with rights that allow them, as they acquire the needed ability, to participate in the educational activities by reading content on the lessons' key topics, carrying out practical



assignments, uploading files when requested, responding to learning quizzes, writing on the forums and other tasks.



3 Realizing Mu.SA VET curricula

3.1 Methodology for VET implementation

In the Mu.SA project, the consortium applied a two level methodology. The 1st level described below refers to the methodology was adopted by the Mu.SA consortium and was used throughout the project lifecycle in order to realize the Mu.SA VET curricula. The 2nd level referred to the two training stages (MOOC and Specialization course) and the methodology adopted in order to develop content for the Mu.SA VET curricula based on learning outcomes according to the Bloom Taxonomy⁷, as it is the most critical part for the effectiveness of both MOOC and Specialization course, and are described in details in 4.1 Instructional design methodology for the Mu.SA MOOC content development and 4.2 Instructional design methodology for the Mu.SA Specialization course content development.

Therefore the 1st level methodology adopted by the Mu.SA consortium for realizing Mu.SA VET curricula using blended learning was an instructional methodology which were developed and provided to the museum professionals during the lifecycle of the project. The methodology followed, illustrated the five phases of the instructional design of the well-known ADDIE model (Analysis, Design, Development, Implementation and Evaluation). This methodology – contextualized appropriately for the development of the Mu.SA blended course.

⁷ Bloom, B.S. (1956). Taxonomy of educational objectives: The classification of educational goals. New York, NY: Longmans, Green.

3.1.1 A. Analysis phase

During the analysis phase the training problem that will be addressed through the Mu.SA VET curricula is analyzed in order to specify the purpose of training, the knowledge domain, the main learning goals, the basic learning objectives and the learners' profile, and to set the necessary limitations and knowledge prerequisites. Thus, the subject of teaching and the learning goals are determined, according to WP2 – Identification of emerging roles of museum professionals, defining the four emerging job role profiles:

- R1: Digital Strategy Manager
- R2: Digital Collections Curator
- R3: Digital Interactive Experience Developer
- R4: Online Community Manager

In the same WP the main learning goals and the basic learning objectives are determined for each job profile:

The **Digital Strategy Manager** has a strategic function in order to help museums to thrive in a digital environment.

S/he is in charge of a digital transformation plan in line with the overall museum strategy.

S/he is responsible for the museum digital strategy and the financial planning of technological resources at a senior level, alongside the overall museum management.

S/he plays a mediating role between the internal museum departments and external stakeholders, and is able to effectively communicate with various different stakeholders, especially high-tech companies.

S/he is comfortable with working with both back-end and front-end technologies.

S/he has a good knowledge of how a museum works.

The **Digital Collections Curator** is responsible for implementing the digital strategy relevant to collecting, storing, archiving,

preserving and making accessible the digital collections (either born – digital or digitized).

In larger museums this could be a role-profile in itself, while in smaller museums a curator should be up skilled in the area.

The **Digital Interactive Experience Developer** designs, develops and implements innovative and interactive experiences based on audience needs, providing meaningful experiences for all types of audiences.

Facilitates communication flows between various different museum teams and external high-tech companies.

Develops accessibility tools for all types of visitors.

The Online **Cultural Community Manager** answers to the needs of both the online and offline communities.

S/he creates and manages accessible and collaborative online communities for all stakeholders (audiences, colleagues in museums and cultural heritage sector, educational organisations, donors, sponsors, decision makers, etc.)

Designs and implements an online audience development plan in line with the museum's overall strategic communication plan.

At the end of the phase the **learners' profile** is identified as it is described in WP2 deliverables.

3.1.2 B. Design phase

The design phase is the most essential and demanding one in the particular Mu.SA VET curricula development methodology. The purpose of this phase is to define and describe in detail the way training will be conducted during the project lifecycle. Subsequently, for each training phase and for each training component, the learning objectives are defined, as well as the educational strategy that will be applied and the learning outcomes are identified. In each phase, it is equally important to define the students' assessment method.

Thus, the professional development for the four job roles that are specified under the *WP2 – Identification of emerging roles of museum professionals*, and described accordingly in *R2.2 – Emerging Job Profiles for museum professionals*, encompasses two main phases;

The first training phase conducted online for all four roles concurrently (and before learners are allocated into / select them). The common training strategy applied through a **MOOC**, using the same learning materials and activities for all roles, addressing the learners' common needs. This decision was made because (a) the particular competences were common for all the four Job role profiles, and (b) were considered as introductory to the second phase.

The second phase follows a **blended learning approach**, where each different role (profile) will participate in online and traditional face-to-face learning sessions, and the learners will join an engaging and productive work-based learning activity.

The first stage of the VET methodology has foreseen a "horizontal" MOOC of 80 hours equivalent of learning. During this training, all participants were trained in 22 competences in 8 weeks. These 22 competences are the following:

Table 1: MOOC competences

Week	Competence	Type
W1.1	IS and business strategy alignment	e-CF
W1.2	Browsing, searching and filtering data, information and digital content	DigComp
W1.3	Managing data, information and digital content	DigComp
W2.1	Business Plan Development	e-CF
W2.2	Evaluating data, information and digital content	DigComp
W2.3	Identifying needs and technological responses (rescheduled)	DigComp
W3.1	Technology trend monitoring	e-CF
W3.2	Netiquette	DigComp
W3.3	Leadership and change facilitator	21st – Transferrable
W4.1	Innovating	e-CF
W4.2	Innovating and creatively using technology	DigComp
W4.3	Creative thinking skills	21st – Transferrable
W5.1	Needs identification	e-CF
W5.2	Developing digital content	DigComp
W5.3	Collaborating through digital technologies	DigComp
W6.1	Forecast development	e-CF
W6.2	Team working	21st – Transferrable
W7.1	Relationship management	e-CF
W7.2	Protecting personal data and privacy	DigComp
W8.1	ICT quality management	e-CF
W8.2	Communication skills	21st – Transferrable
W8.3	Time management	21st – Transferrable

Each e-CF competence is taught in about 5 hours of study (for the e-4 level equivalent to EQF 7, plus 2 hours for e-5 level equivalent to EQF 8). Each DigComp competence is taught in 1-2 hours of study, whereas each 21st century (transferrable) competence was taught in approximately 3 hours of study. All of those aggregately sum up to 80 hours of study (10 hours per week on average).



The application of DigComp by Mu.SA is one of its key achievements in the European level.

Table 2: Mu.SA competence allocation

PARTNER	MOOC			SPECIALIZATION COURSE			TOTAL
	Digital (e-CF)	Digital (DigComp)	21 st Cent – Transferrable	Digital (e-CF)	Digital (DigComp)	21 st Cent – Transferrable	
P1: HOU	4	4		8	1		17
P2: MeP	1		1	1	1	5	9
P3: ICOM PT			1		1	5	7
P4: LCU	1	2	1	1	1	3	9
P7: UP	1	1	1	7	1	1	12
P8: AKMI	1	2	1	4	1	1	10
TOTAL	8	9	5	21	6	15	64

Thereafter, the specification of the course's Learning Outcomes (LOut) is conducted using the Bloom's Taxonomy (see a complete guide for writing effective Learning Outcomes in Appendix 3), analyzing the learning goals and objectives that have been previously set (Analysis phase) in particular knowledge, abilities or skills (i.e. learning outcomes) that the learner should ideally be able to do after the successful completion of the course.

For each learning outcome defined above a Learning Object (LO) should be designed in the current step in order to fulfill it. The design should include at least the following information:

- The LO's *title*
- A short *description* of the LO's content
- The primary *language* used within the LO
- The LO's *learning resource type*
- The *format* of the LO
- The *keywords* describing the topic of the LO
- The *learning outcomes* that the LO serve

- *Reference to existing educational material* that can be used as content of the LO

The above elements constitute in substance, the draft of a LO and provide all the required information that is necessary for the development of LOs.

Subsequently, each one of the two training phases (MOOC and Specialization course) will be analytically designed as described in details in Chapter 4.

3.1.3 C. Development Phase

The development phase includes the production of the educational material (content) which is based on the design realized in the previous phases of the Mu.SA VET curricula.

The learning objects (core, additional supportive material, collaboration and assessment learning objects) are developed as conceived in the previous phase according to their technical type with respect to their learning resource type for each of the two training phases (MOOC and Specialization course) and for every component (competence) as described in details in Chapter 4.

During the development phase, authors collaborate with multimedia developers, video experts (technical staff), who contribute in creating or editing qualitative educational videos and additional digital educational material as described in the design phase.

Simultaneously, the technical team sets the on line Platforms, integrates the educational material into the platform and creates the platform manuals, while social partners design the implementation of the MOOC, the blended course and the Work-based learning.

The MuSA VET content development

During the design and development phases of the above main methodology and in order to apply the second of the two level methodology, the well-known ADDIE model (Analysis, Design, Development, Implementation and Evaluation) was applied in the two training phases (MOOC and Specialization course). The objective was to develop content based on the learning outcomes approach according to the Bloom Taxonomy for the realization of the MuSA VET curricula, as this is the most critical part for the effectiveness of both the MOOC and Specialization course (see also 4.1 Instructional design methodology for the Mu.SA MOOC content development and 4.2 Instructional design methodology for the Mu.SA Specialization course content development). More specifically, the consortium applied the methodology provided by the WP3 leader, the HOU. This methodology that was based on the learning outcomes of the Bloom taxonomy, aims to produce learning objects based on the identified learning outcomes.

Bloom and his colleagues advanced their work mainly in the cognitive domain, as this is required in the majority of cases. They produced a hierarchical framework through which one (learner) may build upon prior learning and upscale its knowledge. Apart from other purposes, it is used extensively to write learning outcomes providing the foundations for developers. Its ready-made structure, in conjunction with the provided (list of) verbs, facilitates significantly the writing of learning outcomes. Bloom's taxonomy of cognitive domain consists of the following six levels (Bloom et al, 1956, Kennedy et al, 2006⁸).

Also during the design and development phases, an important number of supportive documents were authored by HOU in order to support all participants in these phases in the Mu.SA VET content development and improve the quality of the results. These supportive documents can be found in the Appendix 2 Supportive documents and they are:

⁸ Kennedy, D., Hyland, A. & Ryan, N. (2006). Writing and Using Learning Outcomes: a Practical Guide. Bologna: European Higher Education Area (EHEA).).



Supportive documents

1. Mu.SA MOOC instructions for completing the TB3 and TB3a tables (Design of Learning Objects) + Workload estimation (in Appendix 2)
2. Comments on Mu.SA TB3 - Learning object template (in Appendix 2)
3. Scientific Reviewer Check Form Template (MOOC + Specialization Course) (accompanying document)
4. Scientific Reviewer Check Form for Practical Assignments (accompanying document)
5. Assessment Objects (Guidelines + Template) (accompanying document)
6. Transcripts Template (accompanying document)
7. Educational Video Guidelines (accompanying document)
8. Structural guidelines for online distance learning textual material (in Appendix 2)
9. Structural guidelines for online distance learning presentations (in Appendix 2)
10. Guidelines to select OER for the Mu.SA Project (accompanying document)
11. Presentation Learning Object Template (accompanying document)
12. Learning Object Description Template (accompanying document)
13. Practical assignments (types) (in Appendix 2)

3.1.4 D. Implementation phase

During this phase, the educational process is implemented as designed and developed in the previous phases, and the learning effectiveness is assessed.

The primary goal of this phase is the dissemination and publication of the courses. The courses promoted and disseminated via the social networks, advertising, communities and email DBs, newsletters and relevant websites of culture.

Subsequently, the education process of the Mu.SA VET curricula (MOOC course, blended learning course and work based learning)

realized in predefined time periods, supported by tutors and technical staff.

First, the pilot version of the Massive Open Online Course (MOOC) which developed under the Mu.SA consortium is delivered in 80 hours equivalent of learning. During this training, all participants are trained in 22 competences in 8 weeks.

The reader may find more information about the MOOC course methodology and implementation of the Mu.SA project on R4.2 Deliverable.

The delivery of the blended course is at the heart of the Mu.SA project, after the completion of the delivery of the Mu.SA MOOC. It consists of Face-to-Face (or in class training), online and self-study via the e-learning platform and other educational sources.

Concerning the specialization course, the Mu.SA VET methodology foresees that after a careful selection of trainees (based on particular criteria), they should be enrolled to the online learning devoting around 20 hours per week in the beginning. Then, gradually, this effort must decrease as they enrol in parallel to the work based learning. Both online and work based learning are characterized by particular learning outcomes. The online learning includes also practical learning activities (assignments) related to the actual working tasks of the four different Mu.SA Job role profiles. Formative and summative techniques must be employed to validate the accomplishment of the foreseen learning outcomes.

The blended Course has an overall duration of 360 hrs in total. This includes Face to Face learning (24 hrs), online and self-study (288 hrs) and assessment (48 hrs).

The components of the blended course are:

1. Face-to-Face Classroom: this includes class based activities and the practical application of the learning attained.
2. Digital/Virtual Classes and self-study: The virtual learning environment contains lecture notes and practical assignments.
3. Assessment: Formative and summative assessment is foreseen as described in the Evaluation phase.



The reader may find more information about the blended course methodology and implementation of the Mu.SA project on R5.4 Deliverable.

The work-based learning of the Mu.SA project was set to last 10 weeks (205 hrs.), including 200 hrs of practical in real work environment learning (placement) and 5 hrs of assessment. This phase provides an immersive experience for the learners as they have the opportunity to learn first-hand, by applying their knowledge and experience to a pre-defined situation. The Project partners worked in country clusters with the social partners (ICOM GR, IBACN, ICOM PT, MAPAS) undertaking the task to find and select the work places that hosted the trainees. The social partners were also engaged to the assurance of the quality of the learning materials, mainly through the scientific review of the practical assignments. In addition to this, they selected supervisors checking weekly on the learners. Read more on the work-based learning methodology and implementation of the Mu.SA project on R5.5 Deliverable.

3.1.5 E. Evaluation phase

Curriculum evaluation is a necessary and important aspect of any training process. It provides the basis for curriculum policy decisions, for feedback on continuous curriculum adjustments and processes of curriculum implementation.

The fundamental concerns of curriculum evaluation relate to:

- Effectiveness and efficiency of educational practice;
- Status of curriculum contents and practices;
- The achievement of the goals and aims of training programs.

Curriculum evaluation aims to examine the impact of implemented curriculum on student (learning) achievement in order to be revised if necessary and to review teaching and learning processes in the classroom.



In order to define the Curriculum evaluation for the Mu.Sa Project VET curricula provided, we have to consider the *Assessment strategy* and the assessment methodology. Assessment strategy refers to the overall framework within which are set the various assessment activities that are envisaged, while *assessment methodology* refers to techniques and tools for assessing the activities designed and realized and the acquired learning outcomes.

Furthermore, the evaluation shall be conducted in two directions. Formative evaluations should take place in every phase while the final evaluation takes place at the end of all phases, in order to uncover improvement issues. Therefore, the evaluation consists of formative and summative assessment, which includes:

- (A) Formative Assessment:** The formative evaluation is conducted in each stage of the process and includes information collection (check sheets, focus groups results, interviews, questionnaires etc.) in order to identify problems. During the procedure, revisions must be done whenever evaluation considers it necessary. The purpose of the formative evaluation is (a) to estimate the correct implementation of every step of the development process and (b) to verify the quality of the delivered course.
- (B) Summative Assessment:** The final assessment measures the effectiveness of the educational procedure; providing feedback from users and team members using interviews, system logs (providing information of platform usage, rates of attendance in every activity etc.), questionnaires etc.

The Mu.SA consortium has adopted the following approach so as to address these complementary components in every stage and step of the realization of VET curricula. First of all, for each one of the two training phases (MOOC and Specialization course) during the content development procedure performed both the formative assessment (using check-lists and technical and scientific reviewers) and summative assessment (using questionnaires) which analytically described in details in Chapter 4. The quality of the outcomes in each phase during the content development procedure

is assured by the employment of three roles; the **author**, the **technical reviewer**, and the **scientific reviewer**. The author is responsible to design and develop the content. The technical reviewer monitors the intermediary outcomes and assures that they follow the instruction, e.g. each particular template is appropriately filled in. The scientific reviewer assures on the coherence and validity of the contents produced.

Subsequently, during the delivery of the MOOC and the blended learning course the acquisition of the learning outcomes (educational performance) measured in order to define the training effectiveness (using learning quizzes, practical assignments etc.). On the other hand in the WBL, **monitoring** is conducted by both the VET provider and the social partner (per country). Given the fact that on-site visits are not always feasible, at least in high frequency as many learners / WBL sites are spread all over the countries,

- the social partners send a message to the learners every week requesting information about the progress of the WBL and solving their questions
- the VET providers send a message to the learners every two weeks focusing mostly on the learning aspect of the WBL.
- Both kinds of partners enhance their monitoring through on site visits.

Assessment methods used are analyzed in the following sections. In general, the following types of monitoring and assessment have been adopted in the Mu.SA specialization courses:

Table 3: Mu.SA assessment types adopted

Type of assessment	Online	Face-to-face	Work-based learning
Formative	<ol style="list-style-type: none"> 1. Observation (monitoring) of learners' progress by the tutor 2. Monitoring of the learners' progress for the submission of practical assignments 3. Informative feedback from tutors through a particular form 	Collaborative learning (not rated)	<ol style="list-style-type: none"> 1. Description of tasks and activities performed (learner – supervisor) 2. Weekly question by the social partner (optional)⁹ 3. Bi-weekly questionnaire by the VET provider 4. On site visits
Summative	<ol style="list-style-type: none"> 1. Learning quizzes 2. Practical assignments 		<ol style="list-style-type: none"> 1. Final presentation 2. WBL final report

Therefore, methods used include: online forms (questionnaires), papers (practical assignment description), exams, project assessment. Peer assessment will not be employed. Concerning the Work-based learning, the Mu.SA project developed and shared with the engaged stakeholders (learners, VET providers, employers) indicative learning activities furnished with learning outcomes. The assessment of the work-based learning was conducted (a) through a WBL (predefined) detailed report, respecting the copyrights issue, and (b) through a WBL presentation. The engagement of social partners to that (assessment design) ensured the scientific coherence of the approach.

All summative questions / project work in the online learning are based on units of learning outcomes per learning module. The summative assessment of the WBL was based on the WBL presentation (30%) and the WBL report (70%). Formative assessment is also based on learning outcomes, mainly qualitatively by the tutor.

⁹ This applies only if the VET provider organizes the program in collaboration with a sector representative

	Assessment Questions	Project work	Observation in WBL (tutor-supervisor)	Assessment of the implementation of competences during the WBL activities ¹⁰	WBL project reporting
<i>Assessor</i>	<i>Automatic</i>	<i>Tutor</i>	<i>Tutor – Supervisor</i>	<i>Supervisor</i>	<i>Social Partner / VET provider</i>
<i>Grades</i>	<i>Predefined</i>	<i>Scale 1-10</i>	<i>Scale 1-10</i>	<i>Scale 1-10</i>	<i>Scale 1-10</i>

Concerning the grading,

- In the MOOC, each competence module was contributing equally to the final grade, with the percentage of each competence spread equally between the assessment objects. The learner should reach the threshold of 80% in order to pass and receive a certificate.
- The Specialization course final grade is synthesized with the grade of the blended learning (50%) and the grade of the work-based learning (50%). Concerning the blended learning, the following formula is applied:

$$\text{Module Grade} = \left[\frac{0,6 * \text{of sum quiz grades}}{\text{Nr of quizzes} * 10} + \frac{0,4 * \text{of sum P. A. grades}}{\text{Nr of P. A.} * 10} \right] * \text{Max Grade}$$

Whereas the work-based learning grade is synthesized by the grade of the WBL report (70%) and the grade of the WBL presentation (30%).

The reader may find more information about the grading of the blended course on R5.4 Deliverable.

Overall, in order to obtain the certification for each Job profile, participants:

- Completed successfully the “Mu.SA MOOC on Essential Digital Skills for Museum Professionals”. This was an 8 week course with a total study load of around 80 hours delivering a complete set of digital and transferable competences for museum professionals in the Digital Era.

¹⁰ Very difficult to be implemented, very time consuming



The course was based on a curriculum of 22 competence modules, delivered fully online, with the support of online tutors. The assessment was based on the learning outcomes characterizing the competence modules delivered, and was conducted online through multiple choice assessment quizzes.

Examination: Pass (80%) / Fail

- b) Completed successfully the “Mu.SA Specialization Course for (one of the Job Role profiles)”. This was a 24 week course, including face-to-face (around 24 hours), online (around 155 hours) and work-based (around 205 hours) learning, with a total study and practice load of around 384 hours, delivering a specialized set of digital and transferable competences for each separate Job Role Profile.

The online learning component of the course was based on a curriculum of 22-26 competence modules (depending on the VET curricula), delivered fully online, with the support of online tutors. The face-to-face learning sessions was used to enhance collaborative learning, solve questions, and implement case studies. The work-based learning was conducted by the learner in a museum or cultural organization, based on pre-defined and agreed learning activities. The assessment of the online learning was based on the learning outcomes characterizing the competence modules delivered, and was conducted online through multiple choice assessment quizzes and graded practical assignments (accumulating the 50% of the final grade). The assessment of the work-based learning was conducted through a report and a presentation based on predefined standards (accumulating the 50% of the final grade).

Examination: Pass (80%) / Fail

Learners nominated a certification with 30 ECVET points, different per Job Role profile (since the training program, aggregately, had a learning duration of 464 hours. The 259 hours (around 56% of the duration) were delivered online and face-to-face, whereas the 205 hours (around 44% of the duration) considered work-based learning) of the Level 5 in the:

- European Qualifications Framework
- Italian Qualifications Framework
- Hellenic Qualifications Framework
- Portuguese Qualifications Framework

Signed by the Mu.SA partnership.



3.2 Association of ECVET to Mu.SA VET curricula

The mobility and the provision of equal opportunities to EU citizens (and professionals) is at the heart of the EU agenda. All these people that move towards EU countries borders in order to improve their welfare and social well-being, dispose skills and competences obtained in various settings, originating mainly from formal, non-formal and informal learning activities. These activities can be translated into learning outcomes, a “connecting link” that can be used to facilitate the recognition of citizens’ knowledge, skills and competences. In 2009, the EU published the Recommendation of the European Parliament and of the Council on the establishment of a European Credit System for Vocational Education and Training (ECVET)¹¹. The aim of this Recommendation was to create a European Credit System for VET in order to facilitate the transfer, recognition and accumulation of assessed learning outcomes of individuals who are aiming to achieve a qualification.

According to the CEDEFOP, the ECVET “enables learners to accumulate, transfer and use their learning in units as these units are achieved, in order to build a qualification gradually from the learning outcomes they acquired through various and different formal, non-formal and informal learning activities / contexts. The system is based on units (groups) of learning outcomes as part of qualifications that can be assessed and validated”.

ECVET points are numerical representations of the overall weight of learning outcomes in a qualification and of the relative weight of units in relation to the qualification¹². Typically, the VET systems do not use units of learning outcomes¹³, in order to structure qualifications. Mu.SA decided to form units of learning outcomes. Following a top-down approach, the units formulated are represented as competences / modules, entitled under the umbrellas of digital competences (e-CF and DigComp compliant) and transversal competences / 21st century skills. In compliance

¹¹ [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0708\(02\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0708(02)&from=EN)

¹² <https://www.ecvet-secretariat.eu/en/content/what-are-ecvet-points>

¹³ http://www.ecvet-projects.eu/Documents/Examples_Units%20of%20LO_guidelines_2nd%20generation.pdf



with the Recommendation of 2009, each unit (module / competence) includes a generic title, it belongs to one or more defined job role profiles (prospective qualifications mapped to the EQF and NQFs), the learning outcomes it includes, the assessment criteria (objects), and the duration of the unit.

A wise examination was conducted so as to ensure that these units were discrete and separate, therefore a re-organization / re-grouping of learning outcomes in units was not required. At this point, we have to remind the reader that the 4 Mu.SA Job Role Profiles do not consist (yet) formal qualifications, as this procedure is very time consuming and different between the countries; but, the Mu.SA consortium decided to design the procedure as if they were already (formal) qualification, while in parallel the social partners in the project countries would initiate and implement the procedure.

Moreover, the “Mu.SA” units are described as follows (compliant with the 2009 Recommendation of Council):

- They are described in legible and understandable terms by referring to knowledge, skills and competences contained in them. The respective learning content design templates include fields that enable the author to fill in this kind of information;
- They are constructed and organized in a coherent way with regard to the overall qualification. In the Mu.SA case, the units (modules) were formulated following the pre-defined in the frameworks description, customized to the needs of the Mu.SA VET curricula (in the museum sector). They are also placed in range so as to facilitate the learner to gradually obtain the respective knowledge and develop the skills and competences required from the Job Role profile of interest.
- They are constructed in a way that enables discrete assessment and validation of learning outcomes contained in the unit. All (online) learning materials developed by Mu.SA are characterized by one or more learning outcomes; each learning outcome is assessed by at least one assessment object. A separate procedure is described in R3.3 orienting to

the validation of prior, non-formal and informal learning, with the outer objective of the validation of learning outcomes.

According to the Recommendation, 60 ECVET points are allocated to the learning outcomes expected to be achieved in a year of formal full time VET. Given the fact that the three project countries (Italy, Greece, Portugal) have not established yet a specific convention for defining ECVET points¹⁴, the following methodology is used to estimate the ECVET points for the Mu.SA VET curricula:

- 1 year full time VET \cong 900 hours
- Mu.SA MOOC AND Mu.SA specialization course (incl. online, f2f, WBL) \cong 440 hours, i.e. the 49% of 1 year of full time VET

Thus, the competent bodies decided that each VET curricula should be awarded with 30 ECVET points.

Of course, after that, ECVET points can be allocated to each different unit according to their relative weight within the qualification. This work can be done when the Mu.SA Job Role Profiles become official qualifications.

¹⁴ e.g. in Malta, 1 ECVET point = 10 learning hours



3.3 An emerging European standard for the specification of learning outcomes

This section aims to define a quality model for the educational material (EM)¹⁵ used for teaching in distance learning environments education, characterized by learning outcomes. It also aims to support organizations that design, create, manage and use educational materials, accompanied with learning outcomes, with the necessary quality tools (expressed as quality attributes) to achieve the aims of distance education. The model describes quality characteristics for any kind of educational material used in distance education and is accompanied with learning outcomes.

The model describes the quality characteristics of the educational material based on data quality characteristics and software quality characteristics. Each of quality characteristics of the EM quality model varies significantly depending on the type of the educational material being evaluated and the stage of the cycle (of the educational material) applied to.

The Template Model for Educational Content Quality is based on the ISO 25000 series, and specifically to the ISO 25012 which is part of the quality standard SQuaRE (Software product Quality Requirements an Evaluation – Data Quality Model). Concerning the digital educational material, the standard adopts the quality characteristics of the ISO 9126, ISO25000 and 25010. These standards are enhanced with the EU agenda on learning outcomes. Additional characteristics refer to educational software and educational systems, ensuring the interactivity of the educational content. Moreover, we emphasize to (a) the characteristics of distance education, (b) the educational appropriateness of the material.

The EM quality model can be applied as a guide to the design, the creation and the evaluation of the educational material, describing the broader theoretical framework of its application during the life

¹⁵ Educational material is data in print or digital form designed to drive the learners in fulfilling the stated learning goals. It can be standalone or the combination of the following basic visualization formats: text, audio, graphics, video, animation.

cycle of the educational material. Within the model they are defined and evaluated different perspectives for all involved in the educational material life cycle (team of specifications, creators, internal and external evaluators) as well as external users (students and teachers).

The Template Model for Educational Content Quality assesses the quality of data emphasizing both to the educational content and the software quality, when referring to digital educational material. Therefore the quality model adopts the quality features of the two standards that inherit / transfer their features from data to the software. The following table shows the quality characteristics of the model:

Table 4: Quality characteristics of the emerging European standards for the specification of learning outcomes

Model characteristics	Synthesis		
	Data	Software	Learning outcomes
EXTERNAL QUALITY			
Functionality	*	*	*
Consistency	*		*
Completeness	*		*
Currency	*		
Precision	*		
Accuracy	*	*	
<ul style="list-style-type: none"> Syntax Semantics 	*		
Interoperability	*	*	
Security	*	*	
Functionality compliance	*	*	
Reliability			

Availability	*		
Recoverability	*	*	
Fault tolerance		*	
Maturity		*	
Reliability compliance	*	*	
Usability			*
Understandability	*	*	*
Manageability	*		
Attractiveness	*	*	
Learnability		*	*
Operability		*	
Usability compliance	*	*	
Efficiency	*	*	
Resource utilization	*	*	
Time behavior	*	*	
Efficiency compliance			
INTERNAL QUALITY			
Maintainability	*	*	*
Analyzability		*	*
Changeability		*	
Stability		*	
Testability		*	
Maintainability compliance		*	
Portability		*	*
Adaptability		*	*
Installability		*	

Co-existence		*	
Replaceability		*	
Reusability			
Portability compliance		*	

In the last column we see the dimensions of the quality that learning outcomes interact and affect.

3.3.1 Functionality

It refers to the capability of the educational material to satisfy the functional requirements and objectives. The educational material must be compliant with the basic operations of the learning systems that support them as well as the basic functions that supports. The quality sub-characteristics of functionality are the following:

Sub-characteristic	Definition
Consistency	Absence of obvious contradictions in the content of the educational material
Completeness	Refers to the extent that all the necessary values (information) of the educational material data have been assigned and saved.
Currency	It refers to the extent to which the data of the educational material are up to date.
Precision	Possibility of giving to the data of the educational material a value to ensure that the information is reliable in a defined context of use.
Accuracy <ul style="list-style-type: none"> Syntactical Semantic 	<p>The extent to which the content of the data of the educational material is in accordance with its true value. Distinguished in:</p> <ul style="list-style-type: none"> Syntactical: The syntactical correctness of the content of the data of the educational material. Semantic: The correct semantic content of the

	educational material.
Interoperability	The ability of the educational material to be accessible, recoverable and interchangeable between different systems and platforms.
Security	Access to educational material only from authorized users.
Functionality compliance	The ability of the educational material to adhere to standards, conventions or Functionality Regulations.

3.3.2 Reliability

As Reliability we define the capability of the educational material to support a defined level of operations in a defined technological environment. The quality sub-characteristics of reliability are the following:

Sub-characteristic	Definition
Availability	The ability of data of the educational material to be always recoverable (available).
Recoverability	The ability of the educational material to maintain and protect its physical and logical integrity even on failure.
Fault tolerance	The ability of the educational material to avoid the creation of problems of educational nature as a result of internal errors.
Maturity	The tolerance of the educational material to the user's mistakes.
Reliability compliance	The ability of the educational material to adhere to standards, conventions or Reliability Regulations.

3.3.3 Usability

Usability is defined as the ability of the educational material to be understandable, manageable and usable to attract user attention underneath defined conditions. The quality sub-characteristics of usability are the following:

Sub-characteristic	Definition
Understandability	The degree to which the educational material has the appropriate expression (language), symbols and units in strictly defined degree and is suitable for the needs and the educational purposes of the user.
Manageability	The ability of the data of the educational material to be stored easily and be functionally manageable.
Attractiveness	The ability of the educational material to be attractive to the user with the most appropriate data representation.
Learnability	It refers to the degree of ease of which the user can learn to use the educational material.
Operability	The ability of the educational material to make the user capable of handling and controlling it.
Usability compliance	The ability of the educational material to adhere to standards, conventions or regulations related to usability.

3.3.4 Efficiency

Efficiency is the ability to process the data of the educational material (access, acquisition, update). The quality sub-characteristics of efficiency are the following:

Sub-characteristic	Definition
Resource utilization	The ability to store data in different types and different sizes. Especially for the digital educational material, the resource utilization refers to the level of use of specific resources at a specified time when a procedure is running under specified conditions.
Time behavior	The ability of the educational material (in particular the digital) to provide a defined and acceptable response time on the execution of processes or actions under specified conditions.
Efficiency compliance	The ability of data to meet standards, conventions or regulations.

3.3.5 Maintainability

The quality characteristic of Maintainability refers to the ability to modify the educational material so as to meet technological requirements or functional specifications. The quality sub-characteristics of maintainability are the following:

Sub-characteristic	Definition
Analyzability	The ability to diagnose the degree of failure or error of the educational material in sections that have been modified.
Changeability	Ease of implementation of changes and modifications of the educational material in terms of type, size, value of data.
Stability	The possibility of minimizing spam results due to modifications on the educational material.
Testability	The ability to test the educational credibility of the educational material that has been or will be modified.

Maintainability compliance	The ability of data to meet standards, conventions or regulations related to the maintainability.
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3.3.6 Portability

The qualitative characteristic of Portability refers to the ability of the educational material to be adaptable from one technological environment to another. The quality sub-characteristics of portability are the following:

Sub-characteristic	Definition
Adaptability	The possibility of modifying the educational material from one technological Platform to another, without requiring different use practices.
Installability	Ability to install the educational material on any educational environment.
Co-existence	The ability of the educational material (Software) to be used on another software environment.
Replaceability	The possibility of coexistence of the educational material as independent in an environment common with other applications.
Portability compliance	The ability of data to meet standards, conventions or regulations related to portability.

4 Designing and developing content for the Mu.SA VET curricula

4.1 Instructional design methodology for the Mu.SA MOOC content development

The professional development for the four job roles specified under the WP2 – Identification of emerging roles of museum professionals, and described accordingly in R2.2 – Emerging Job Profiles for museum professionals encompasses two main stages; the first training stage is conducted online for all four roles concurrently. The common training strategy is applied through a MOOC, using the same learning materials and activities for all roles, addressing the learners' common needs. The second stage follows a blended learning approach, where each different role (profile) participates in online and traditional face-to-face learning sessions, and then the learners join an engaging and productive work-based learning activity.

The methodology described below concerns solely the first stage; it follows a team-based approach for the MOOC development and in the framework of the Mu.SA project.

This methodology – contextualized appropriately for the Mu.SA MOOC development - adopts the basic elements of the well-known ADDIE model (Analysis, Design, Development, Implementation and Evaluation), illustrating an iterative and self-corrected training process since it provides continuous assessment in every step.

The quality of the outcomes in each phase is assured by the employment of three roles; the **author**, the **technical reviewer**, and the **scientific reviewer**.

The author is responsible to design and develop the content. The technical reviewer monitors the intermediary outcomes and assures that they follow the instruction, e.g. each particular template is appropriately filled in. The scientific reviewers assures about the coherence and validity of the contents produced.

4.1.1 Analysis

During the analysis phase the training problem that will be addressed through the MOOC is analyzed in order to specify the purpose of training, the knowledge domain, the main learning goals, the basic learning objectives, the learners' profile and the timeframe of the training process. It is equally important, to define the learners' background knowledge and to set any necessary limitations and knowledge prerequisites.

The expected outputs of this phase are:

A1. Learners Characteristics: Determination of learners' characteristics and their specific needs.

A2. Course Description: Includes the description of the course, i.e. the training problem it addresses, the context of application, the learning goals, the learning objectives and the learners' needs that the course meets. It also specifies its total duration.

A3. Course Time Table: Determines the course length, the schedule, the sequence and the timetable of the course.

A4. Special Needs for the Learning Environment: Special needs are also described (if any) in order to be included in the learning environment.

Indicative questions include the following:

What are the intended audience and its characteristics? What is the desired knowledge outcome? What are the learning limitations? In what ways the knowledge will be delivered? What are the training framework and the duration of the educational process?

The MOOC course lasts 8 weeks. Each week contains 2 to 3 (course) modules (topics) (focus on Digital (e-CF) and / or Digital (e-CF) and Transferrable competences, enhanced with DigComp related competences) of 10 hours of study in total. Every digital competence of e-4 or e-5 level should be taught in approximately 5 hours of study (you could add an amount of additional educational material or a project of an equivalent of 2 hours of study approximately in order to meet the criteria for the e-5 level).

Every transferrable competence should be taught in 3 hours of study, while every DigiComp competence should be taught in approximately 1 to 2 hours of study and is suggested to be a scaffold for the digital competences.

Every module described above consists of 2 to 5 units (learning activities). In each unit (learning activity) an educational strategy should be applied in order to deliver any combination of core learning objects (e.g. video, presentation, etc), additional educational material (e.g. e-books, additional readings, etc), collaboration objects (e.g. forum), assessment objects (projects, self-evaluation exercises, quizzes).

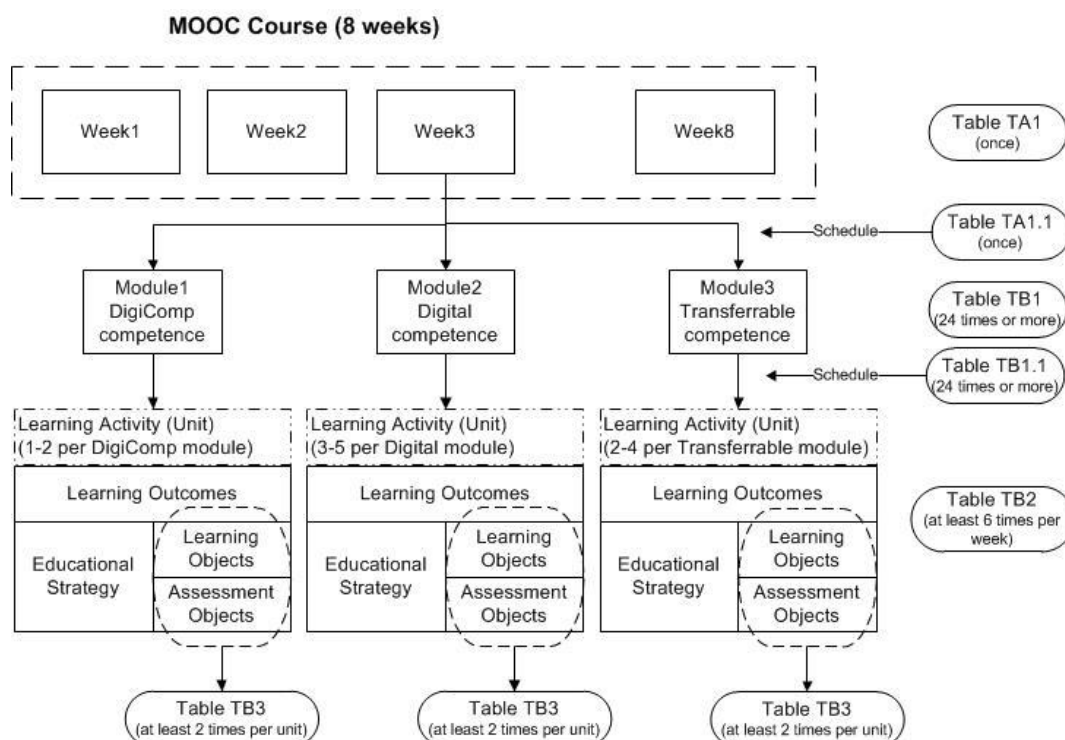


Figure 1 – MOOC Analysis flowchart¹⁶

In this regard, the following tables TA1: Course Description (Analysis Phase), TA1.1: Course Schedule, and TA1.2: Authors, Technical Reviewers and Scientific Reviewers) are used for the analysis phase (in the Appendix 1).

¹⁶ The same approach is used for the analysis of the specialization course

Table 5 – TA1: Course Description (Analysis Phase)

1	Course (MOOC) title	<i>Museum Professionals in the Digital Era</i>
2	Course description	<p><i>This course addresses the needs of professionals working in the cultural sectors that would like to exploit the potential of contemporary technologies in order to accomplish their current and future work duties. In this regard, they shall develop their competences in the following areas:</i></p> <ul style="list-style-type: none"> <i>(1) Business plan development,</i> <i>(2) Technology trend monitoring</i> <i>(3) Innovating,</i> <i>(4) ICT quality management,</i> <i>(5) Needs identification,</i> <i>(6) Relationships management,</i> <i>(7) Information system and business strategy alignment</i> <i>(8) Forecast development</i> <i>(9) Creative thinking</i> <i>(10) Communication</i> <i>(11) Leadership and change facilitation</i> <i>(12) Time management</i> <i>(13) Team working</i>
3	Knowledge domain	<p><i>Knowledge domains of the course are</i></p> <ul style="list-style-type: none"> <i>• Arts</i> <i>• Social and behavioural science</i> <i>• Business and administration</i> <i>• Computing</i>
4	Educational problem	<p><i>The particular course addresses the need of professionals working or would like to work in the cultural organizations, especially museums, to use contemporary technologies and collaborate in order to develop authentic cultural experience for the public, as well as to modernize organizations' operations.</i></p>
5	Course addressed to	<p><i>This course addresses the basic skill needs of digital</i></p>

		<i>strategy managers, digital collections curators, digital interactive experience developers, and online community managers.</i>
6	Course type	Full time
7	Learning goals ¹⁷	<p><i>Main learning goals</i></p> <ul style="list-style-type: none"> • <i>Develop planning digital competences (IS and business strategy alignment, business plan development, technology trend monitoring, innovating).</i> • <i>Develop enabling digital competences (needs identification)</i> • <i>Develop management digital competences (forecast development)</i> • <i>Develop key transferrable / transversal skills (communication, team working, creative thinking, leadership and change facilitator, time management).</i> • <i>Develop citizenship digital competences</i>
8	Basic learning objectives	<p><i>Basic learning objectives (4 up to 10)</i></p> <ul style="list-style-type: none"> • <i>Upon completion of the course, the learner will become proficient in planning particular ICT business processes</i> • <i>Upon completion of the course, the learner will become proficient in enabling particular ICT business processes</i> • <i>Upon completion of the course, the learner will become proficient in the management of particular ICT business processes</i> • <i>Upon completion of the course, the learner will be able to communicate, team work, think</i>

¹⁷ Goals are broad statements, general intentions, intangible, abstract and in general hard to get measures. Objectives are specific, precise, tangible, concrete and measurable. In practice, they are statements that define the expected goal of the course, e.g. "Monitoring and accurate interpretation of data" for "A.7 – Technology Trend Monitoring".

		<i>creatively, lead, facilitate change and manage time effectively and efficiently.</i> <ul style="list-style-type: none"> • Overall, the learner will upgrade his proficient level of citizenship digital competences
9	Course length	8 weeks
10	Course schedule (course modules codes, titles and description)	Please see Table TA1.1
11	Learners' profile	The learners are holders of a Bachelor (EQF 6) with working experience in the cultural sector. Alternatively, it addresses the needs also of people (holders of EQF 6) that would like to work in the cultural or the museum sector.
12	Learners' background knowledge	Learners must present general knowledge of information systems and / or computing, arts and business administration.
13	Participation prerequisites	No prerequisites
14	Special needs from the educational environment	The educational environment (MOOC) is accessible through a personal computer or a tablet, both connected to the internet.

4.1.2 Design Phase

The design phase is the most essential and demanding one in the particular course development methodology. The purpose of this phase is to define and describe the detailed learning objectives for each module, the units (learning activities) in which each module is divided, the educational strategy that will be applied in each unit and the learning outcomes of each unit. In this phase, it is equally important to define the students' assessment method. Consequently, the learning objects should be designed according to the learning outcomes, as described above.

It should be noted that units (learning activities) demonstrate the way that knowledge (learning objects, additional educational material, quizzes, wikis, projects etc.) should be provided to the learners according to the educational strategy adopted.

The main outputs of this phase are:

B1. Course Module Description: A detailed description for every course Module.

B2. Course Units (Learning Activities) Description: A detailed description of the units (learning activities) per course Module.

B3. Learning Outcomes Writing: A catalog recording the course units (learning activity) learning outcomes (as described in Ch.1).

B4. Learning Object Design: A detailed description of the Learning Objects per unit (learning activity).

B5. Learner Assessment Description: A detailed description of the learner assessment of the course module / unit.

The activities of the design phase for the Mu.SA MOOC development are presented in the following flowchart. Each output is related to a specific template (in the Appendix 1) that must be filled in for every module.

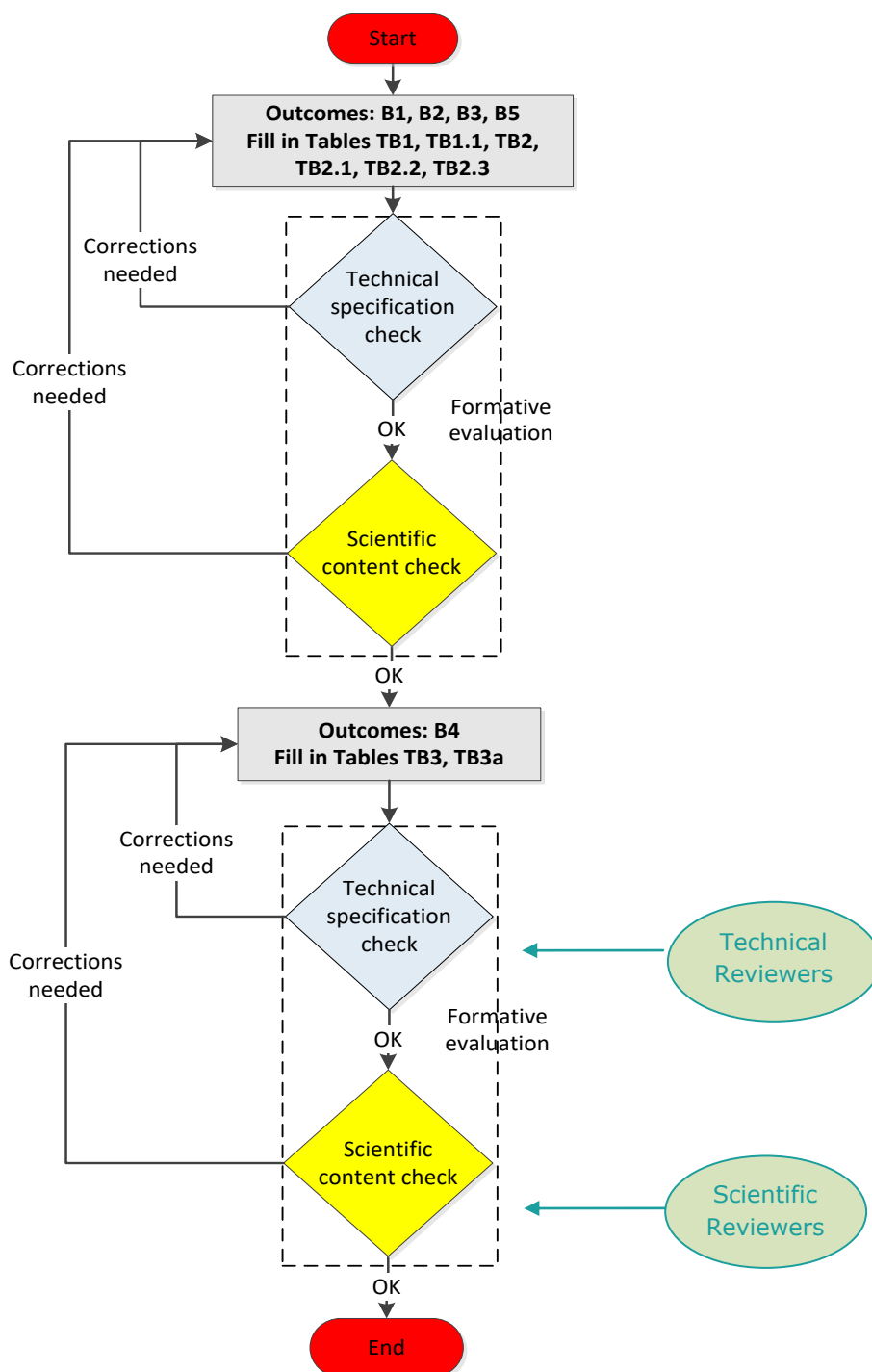


Figure 2 - MOOC Design flowchart

ACTION

Please fill in the templates labeled

- TB1: Course Module Description (Design phase)",
- TB1.1: Course Module Schedule (Design phase)",
- TB2: Course Unit (Learning Activity) Description (Design phase),
- TB2.1: Table of learning outcomes for the Cognitive domain of Bloom taxonomy,
- TB2.2: Table of learning outcomes for the Affective domain of Bloom taxonomy,
- TB2.3: Table of learning outcomes for the Psychomotor domain of Bloom taxonomy, and
- TB3: Learning Object Description (Design phase) (Table 17: TB3: Learning Object (Design Phase)
- TB3a: Assessment Object Design and Production (Design Phase) (Table 17: TB3: Learning Object (Design Phase)

In the Appendix 1, as many times as needed!

4.1.3 Development Phase

The development phase includes the production of the educational material (content) which is based on the design realized in the previous phase.

The learning objects (core, additional supportive material, collaboration and assessment learning objects) are developed as conceived in the previous phase according to their technical type with respect to their learning resource type and subsequently uploaded to the MOOC platform. It is recommended to use the educational material guidelines provided, since there are providing instructions on "what to do" and "what to avoid" during the development process. These guidelines are provided for both the pedagogical and technical aspect of an educational material.

During the development phase, authors could collaborate with multimedia developers, video experts (technical staff), who could contribute in creating or editing qualitative educational videos and additional digital educational material as described in the design phase.



Simultaneously, the technical team sets the MOOC Platform, integrates the educational material into the platform (according to the course module, learning activities templates) and creates the platform manuals.

The main outcomes of this phase are:

C.1 Learning Objects Development: The creation or the adaptation of existing material in order to create all the necessary educational materials and content required for the particular course, based on the previous design.

C.2 Course Development: Set up of the MOOC in the platform¹⁸ and integration of the educational material into the platform.

C.3 User Guides Development: Creation of user's manuals for the MOOC platform.

In the following flowcharts, the reader may see the procedures for the MOOC development (educational material and content, course and user guides) as an example.

¹⁸ According to the MOOC best practices, each course consists of the following 5 pages: a) the Course Info page with news, announcements and additional information, b) the Courseware page which includes the page that shows the sections of the course and the educational material, c) the Discussion page in which discussion forums will be placed, d) the Progress page, which provides updates with useful information and each learner's personal path and e) the Syllabus Page, which includes the Course / Modules Information.



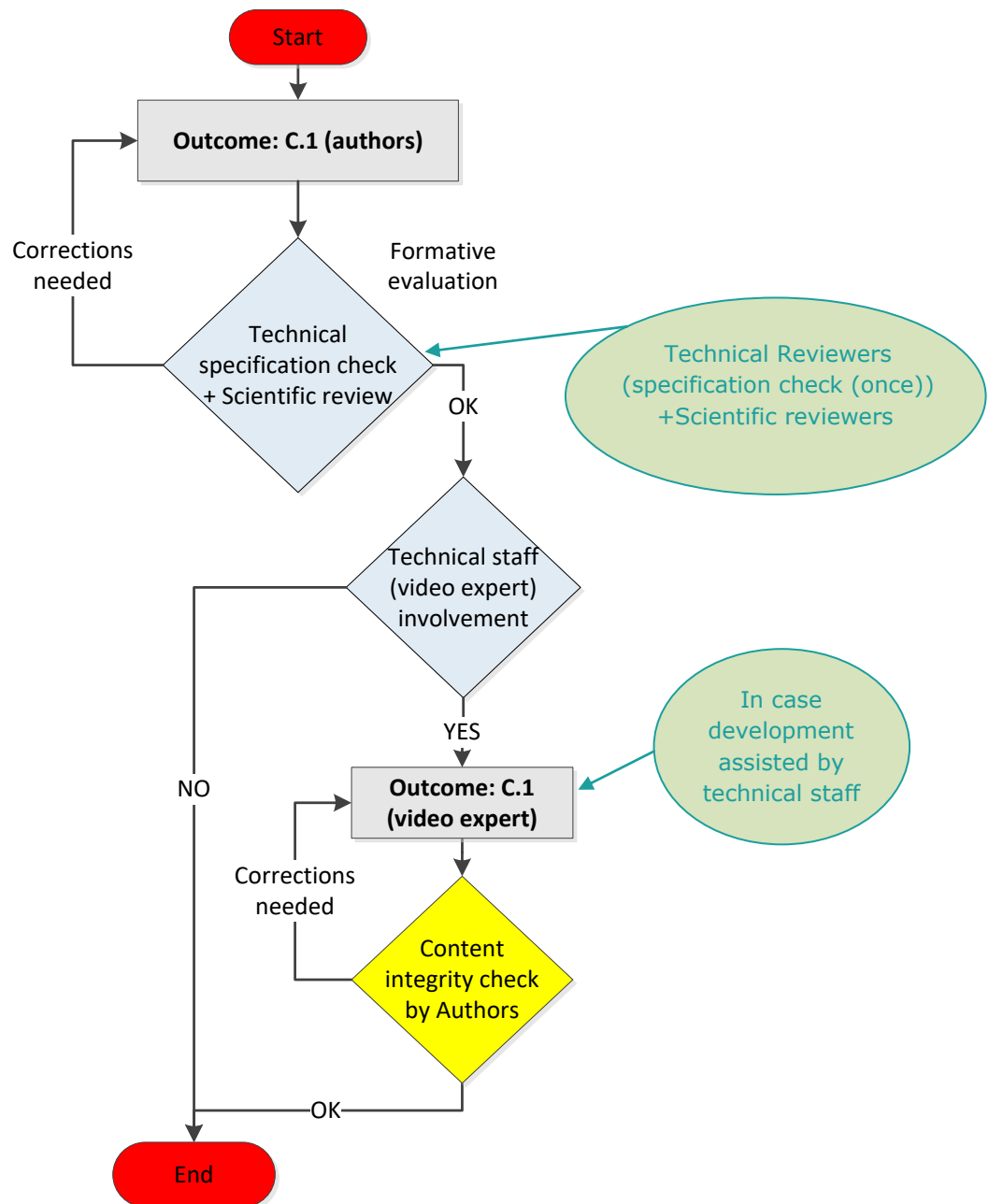


Figure 3 – MOOC Development (educational materials and content) flowchart

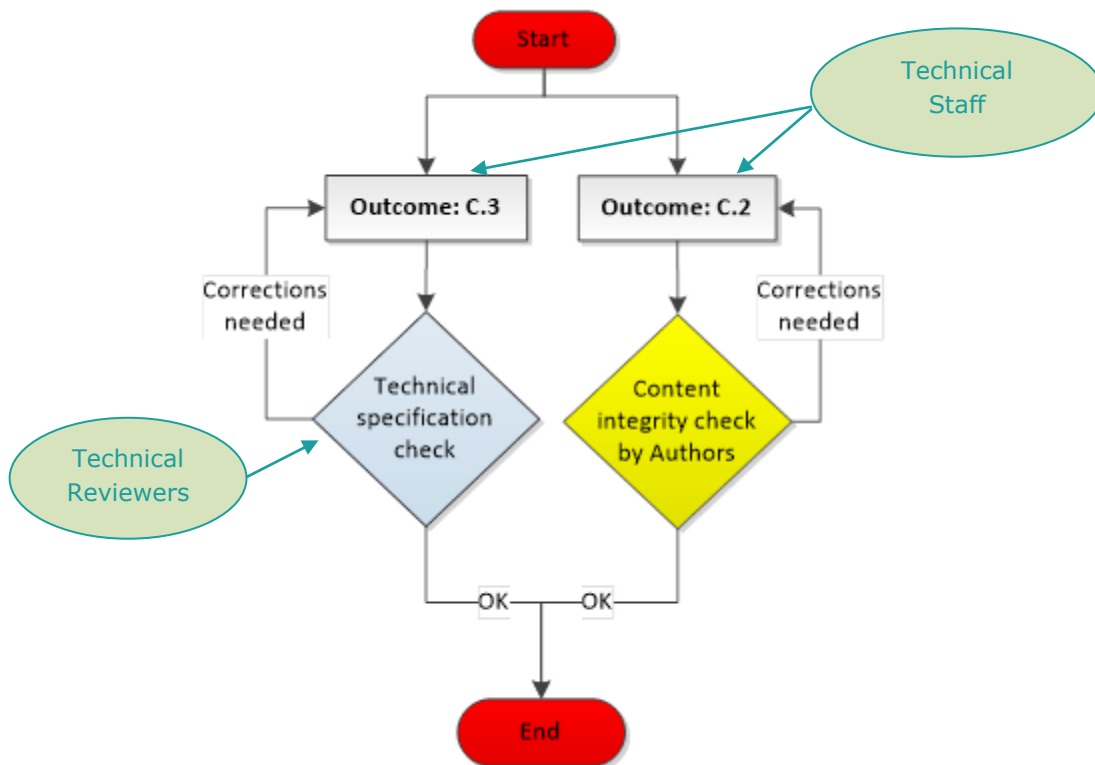


Figure 4 – MOOC Development (course setup and user guides) flowchart

4.1.4 Implementation Phase

During this phase, the educational process is implemented as designed and developed in the previous phases, and the learning effectiveness is evaluated.

The primary goal of this phase is the dissemination and publication of the course. The course can be promoted and disseminated via the social networks, advertising, communities and email DBs, newsletters and relevant websites of culture. Before delivering the course, a pilot course should run in order to test and evaluate the course, and the functionality of the platform for potential improvements. The participants in the pilot course could be a small number of learners and the experienced scientific staff (trainers). After the completion of the pilot course, improvements could be

made to both the platform and the course, according to the comments and reviews by both parties – trainers and trainees.

Subsequently, the education process (MOOC course) will be realized in a predefined time period since tutors and technical staff must support, operate, monitor and audit the education process through the platform.

The main outcomes of this phase are:

D.1 Publication of the available course in communities and social networks.

D.2 Pilot Course running with a small number of learners and scientific personnel.

D.3 Realization of the educational process.

D.4 Support and operation of the education process and the platform.

4.1.5 Evaluation Phase

The evaluation of the proposed methodology shall be conducted in two directions. Formative evaluations should take place in every phase while the final evaluation takes place at the end of all phases, in order to uncover improvement issues. Therefore, the evaluation consists of formative and summative assessment, which includes:

(C) Formative Assessment: The formative evaluation is conducted in each stage of the process and includes information collection (check sheets, focus groups results, interviews, questionnaires etc.) in order to identify problems. During the procedure, revisions must be done whenever evaluation considers it necessary. The purpose of the formative evaluation is (a) to estimate the correct implementation of every step of the development process and (b) to verify the scientific quality of the course.

(D) Summative Assessment: The final assessment measures the effectiveness of the educational procedure; providing feedback from users and team members using interviews, system logs (providing information of platform usage, rates of attendance in every activity etc.), questionnaires etc.

4.2 Instructional design methodology for the Mu.SA specialization course content development

As known MOOC is a static online learning effort while the specialization course employs blended learning and work-based learning. The **Blended training course has foreseen 336h of educational material** (in total for all Job Role profiles) for the online and self-study components, plus the assessment components. The educational content **Blended training course** should be developed using the existing Methodology (as described and implemented in the framework of WP3) with some modifications as shown below.

Initially, according to the description of the WP5, the Specialization course consists of the following:

Table 6: The fundamentals of Piloting the Specialization Course

Mu.SA Specialization Course	
<i>Blended Learning</i>	
A. Blended training course will last 24 weeks (6 months), with an effort of approximately 15h of study / week (totally 360h of study)	
• A1: Online and self-study (288h) (material)	
• A2: Face-to-face sessions (24h = 6 x 4h) (once a month) (incl. skype sessions)	
• A3: Assessment (48h)	
<i>Work-Based Learning</i>	
B. Work-based learning will last 10 weeks, approximately 20,5h of work in the placement / week (totally 205h)	
• B1: Work placement (200h)	
• B2: Assessment (5h)	
<i>Additional training activities (T5.3)</i>	
C. Additional training (f2f) activities for Trainers, Employers and Learners	
• C1: A 2-days seminar for training the Trainers that will take place in a period of 16 week (duration and timing not specified).	
• C2: A 1-day course for training the Employers that will take place in a period of 16 week (duration not specified, to be delivered early before the WBL so as to inform employers and collect their agreement).	
• C3: A 1-day course for training the Learners that will be delivered before they start the work-based learning (duration not specified, after the train the Employers and having their agreement).	

The online and self-study (A1), plus the assessment (A3) components of the **Blended training course has foreseen 336h of educational material** (in total for all Job Role profiles) that should be developed using the existing Methodology (as described and implemented in the framework of WP3).

We remind the reader that, based on the outcomes of WP2, each e-CF competence should be taught to a particular level that corresponds to the EQF.

- e-3 (e-CF) = Level 6 EQF
- e-4 (e-CF) = Level 7 EQF
- e-5 (e-CF) = Level 8 EQF

The table below presents the appropriate total amount of educational material that should be developed. The reader should keep in mind that the total amount of learning effort provided to the learners should be kept stable, so as to achieve the project indicators totally, whereas the minimum effort provided in terms of core material (including the assessment) should be taken into account.



Table 7: Educational material development matrix

Educational material	Digital Competences (e-CF)		
	Level e-3	Level e-4	Level e-5
Core material ¹⁹	4h (min)	5h (min)	6h (min)
Practical assignment	2h	3,5h	5h
Total	6h	8,5h	11h
Educational material	Digital Competences (DigComp)		
Core material	1,5h (min)		
Practical assignment	1,0h		
Total	2,5h		
Educational material	21st Century competences (Transferrable)		
Core material	3h (min)		
Practical assignment	2h		
Total	5h		

Core material consists of material similar to the one developed for the MOOC (Learning (educational) objects and Assessment Objects). The only difference is that, the e-learning material for the Specialization course mostly consists of lectures (self-running presentation – power point presentation with voice over) and additional material of any kind for self-study (papers, videos, e-books etc.). The design and development process is the same as it is for the MOOC.

Practical assignments can include one or more of educational material types as project, example or activity (case study, problem solving, text composition, open ended question) (see [Appendix 2](#) for more details on the above mentioned educational material types) that can be assigned on the learner level or to a group of learners, illustrating collaborative learning activities, in order to enhance trainee engagement and the quality of learning (see [Appendix 1](#) for a template for the development of this kind of material). The design and development process is the same as this of the MOOC.

¹⁹ Including assessment



For each Job Role Profile a competence participates into, multiple practical assignments will be developed customized and adjusted for every profile (in collaboration with the local learning clusters or social partner or a museum professional / expert).

TIP

For the specialization course, it is suggested to write Learning Outcomes of the three upper levels of the Bloom taxonomy (4.Analysis, 5.Synthesis, 6.Evaluation) and use verbs like:

- arrange, classify, compare, differentiate, distinguish, infer for the **Analysis** level,
- construct, create, design, develop, generate, integrate, reconstruct for the **Synthesis** level, and
- assess, criticize, decide, evaluate, grade, judge, predict, rate, recommend for the **Evaluation** level,

that are more suitable for activities like these.



Table 8: Specialization course competences allocation and effort details

	Author	TYPE	R1 (Level)	R2 (Level)	R3 (Level)	R4 (Level)	Core material (hours)	Practical assignment (roles*hours)	TOTAL (max)
A.2 – Service Level Management	AKMI	e-CF	e-4				5	1*3,5	8,5
A.4 – Product / Service Planning	LCU	e-CF	e-3	e-3	e-3	e-3	4	4*2	12
A.6 – Application Design	UP	e-CF			e-3		4	1*2	6
A.8 – Sustainable Development	HOU	e-CF	e-4				5	1*3,5	8,5
B.1 – Application Development	UP	e-CF			e-3		4	1*2	6
B.3 – Testing	LCU	e-CF			e-3		4	1*2	6
B.4 – Solution Deployment	UP	e-CF			e-3		4	1*2	6
B.5 – Documentation Production	HOU	e-CF		e-3	e-3	e-3	4	3*2	10
C.1 – User Support	AKMI	e-CF			e-3	e-3	4	2*2	8
C.2 – Change Support	AKMI	e-CF			e-3		4	1*2	6
C.3 – Service Delivery	HOU	e-CF		e-3			4	1*2	6
C.4 – Problem Management	HOU	e-CF		e-4	e-4	e-4	5	3*3,5	15,5
D.1 – Information Security Strategy Development	UP	e-CF	e-4				5	1*3,5	8,5
D.2 – ICT Quality Strategy Development	UP	e-CF				e-5	6	1*5,0	11
D.3 – Education and Training Provision	UP	e-CF	e-3				4	1*2	6
D.4 – Purchasing	HOU	e-CF	e-4	e-4			5	2*3,5	12
D.10 – Information and Knowledge Management	HOU	e-CF	e-4	e-5			6	1*3,5 + 1*5,0	14,5
D.12 – Digital Marketing	MeP	e-CF				e-4	5	1*3,5	8,5
E.3 – Risk Management	HOU	e-CF	e-4	e-4	e-4		5	3*3,5	15,5
E.5 – Process Improvement	AKMI	e-CF	e-4				5	1*3,5	8,5
E.7 – Business Change Management	UP	e-CF	e-4			e-5	6	1*3,5 + 1*5,0	14,5
Copyright and licenses	MeP	DigComp	✓	✓	✓	✓	1,5	4*1	5,5
Programming	LCU	DigComp	✓	✓	✓	✓	1,5	4*1	5,5
Solving technical problems	UP	DigComp	✓	✓	✓	✓	1,5	4*1	5,5
Protecting personal data and privacy	AKMI	DigComp	✓	✓	✓	✓	1,5	4*1	5,5
Identifying digital competences gaps	HOU	DigComp	✓	✓	✓	✓	1,5	4*1	5,5
Managing digital identity	ICOM PT	DigComp	✓	✓	✓	✓	1,5	4*1	5,5

	Author	TYPE	R1 (Level/ hours)	R2 (Level/ hours)	R3 (Level/ hours)	R4 (Level/ hours)	Core material (hours)	Practical assignment (roles*hours)	TOTAL
T1. Mentoring / coaching skills	MeP	21st Cent	√	√		√	3	3*2	9
T2. Analyse and synthesize information	ICOM PT	21st Cent	√		√	√	3	3*2	9
T3. Negotiation skills	MeP	21st Cent	√		√	√	3	3*2	9
T4. Networking skills	MeP	21st Cent	√	√	√	√	3	4*2	11
T5. Sense of initiative and entrepreneurship	HOU	21st Cent	√	√	√	√	3	4*2	11
T6. Resilience	ICOM PT	21st Cent	√		√	√	3	3*2	9
T7. Decision making	LCU	21st Cent	√	√	√	√	3	4*2	11
T8. Management skills	LCU	21st Cent		√		√	3	2*2	7
T9. Interpersonal skills	ICOM PT	21st Cent		√	√	√	3	3*2	9
T10. Mediation skills	UP	21st Cent		√	√		3	2*2	7
T11. Influence / persuasion skills	ICOM PT	21st Cent		√		√	3	2*2	7
T12. Active listening skills	MeP	21st Cent		√	√	√	3	3*2	9
T13. Storytelling	MeP	21st Cent			√	√	3	2*2	7
T14. Fast-driven	AKMI	21st Cent			√		3	1*2	5
T15. Integrity / ethical	ICOM PT	21st Cent				√	3	1*2	5
SUM (competences / hours)			23	22	27	26			355,5

√=participate

Example 1

HOU has to deliver educational material for **B.5 – Documentation Production** which will appear in 3 job profiles (R2: Digital collections curator (e-3), R3: Digital interactive experience developer (e-3), R4: Online community manager (e-3)). Therefore, should be developed and / or selected,

- 4 hours of core learning material and the appropriate assessment objects addressing the common learning needs of R2, R3 and R4,
- additionally, should be developed practical assignments²⁰ for 2 hours equivalent, customized and adjusted for R2: Digital collections curator, another 2 hours customized and adjusted for R3: Digital interactive experience developer and another 2 hours customized and adjusted for R4: Online community manager.

²⁰ in order to comply with WP2 description and map educational and training needs for each job profile specified.

Example 2

UP has to deliver educational material for **E.7 – Business Change Management** which will appear in 2 job profiles (R1: Digital Strategy Manager (e-4), R4: Online community manager (e-5)). Therefore, should be developed and / or selected,

- 5 hours of core learning material and the appropriate assessment objects addressing the common learning needs of R1 and R4 (e-4),
- 1 additional hour of core learning material to reach level e-5 for R4
- additionally, should be developed practical assignments²⁰ for 3,5 hours customized and adjusted for R1: Digital Strategy Manager, and another 3,5 hours plus 1,5 hours customized and adjusted for R4: Online community manager.

Example 3

MeP has to deliver educational material for **T4. Networking skills**, required for all job profiles (R1: Digital Strategy Manager, R2: Digital collections curator, R3: Digital interactive experience developer, R4: Online community manager). Therefore should developed,

- 3 hours of core material and the appropriate assessment objects addressing the common learning needs of all four roles,
- additionally, should be developed practical assignments²⁰ for 2 hours customized and adjusted for R1: Digital Strategy Manager, another 2 hours customized and adjusted for R2: Digital collections curator, another 2 hours customized and adjusted for R3: Digital interactive experience developer and another 2 hours customized and adjusted for R4: Online community manager.

Appendix 1: Methodology templates (Tables)



Table 9: TA1.1: Course schedule

Week	Module Code	Module Title	Module Description	Author
1	W1.1			
1	W1.2			
...		
2	W2.1			
2	W2.2			
...

Table 10: TA1.2: Authors, technical reviewers and scientific reviewers

Week	Module Code - Title	Author	Technical Reviewer	Scientific Reviewer
1				
2				
...				

Table 11: TB1: Course Module Description (Design Phase)

TB1: COURSE MODULE DESCRIPTION		
1	Course Module title	<i>Title of Course Module</i>
2	Course Module code	<i>Course Module code</i>
3	Course Module description	<i>Description of the module (up to 100 words)</i>
4	Knowledge domain	<i>Knowledge domain of the module</i>
5	Learning objectives	<i>Learning objectives (4 up to 10) for the specific course module</i>
6	Module schedule (course units codes, titles and description)	<i>Specify for each module; the codes, the titles and the description of every unit (learning activity) Please fill in Table TB1.1</i>
7	Assessment method	<i>Description of the means and tools of the learners' assessment for the specific course Module</i>

Table 12: TB1.1: Course Module Schedule (Design Phase)

TB1.1: COURSE MODULE SCHEDULE			
Module Code	Unit Code	Unit title	Unit description

(*) Unit = learning activity

(**) A unit (learning activity) should be approximately 1-2 hours of study

Table 13: TB2: Course Unit Description (Design Phase)

TB2: COURSE UNIT (LEARNING ACTIVITY) DESCRIPTION		
1	Unit title	<i>Title of Unit</i>
2	Unit code	<i>Unit code (should be consistent and should reflect the corresponding module)</i>
3	Unit description	<i>Description of the Unit (learning activity) (up to 100 words)</i>
4	Educational strategy	<i>Description of the educational strategy (e.g. presentation, role playing, case study) will be adopted for the specific unit (learning activity)</i>
5	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific unit. Use TB2.1.</i>
6	Unit core material (Learning object (LO)) (code and title)	<i>List of Learning objects (videos, presentations, etc.) included in the specific unit (codes should be consistent and should reflect the corresponding unit)</i>
7	Unit additional material (code and title)	<i>List of additional material (e-books, additional readings, etc) included in the specific unit (codes should be consistent and should reflect the corresponding unit)</i>
8	Collaboration objects (code and title)	<i>List of Collaboration objects (e.g. forum) included in the specific unit (codes should be consistent and should reflect the corresponding unit)</i>
9	Assessment objects (projects, self-evaluation exercises, etc.) (code and title)	<i>Detailed description of the learners' assessment for the specific unit (codes should be consistent and should reflect the corresponding unit)</i>
10	Unit schedule	<i>Description of the educational path for the defined unit</i>
11	Key words	<i>Key words (3 to 10)</i>

Table 14: TB2.1: Learning outcomes for the cognitive domain of the Bloom Taxonomy

TB2.1: Learning outcomes for the Cognitive domain (Bloom Taxonomy)	
Code	Learning Outcome (please underline the verb and the concept of the knowledge domain used)
1. Knowledge level	
2. Comprehension level	
3. Application level	
4. Analysis level	
5. Synthesis level	
6. Evaluation level	

Table 15: TB2.2: Learning outcomes for the affective domain of the Bloom Taxonomy

TB2.2: Learning outcomes for the Affective domain (Bloom Taxonomy)	
Code	Learning Outcome (please underline the verb used)
1. Receiving category	
2. Responding category	
3. Valuing category	
4. Organisation category	
5. Characterization category	

Table 16: TB2.3: Learning outcomes for the psychomotor domain of the Bloom Taxonomy

TB2.3: Learning outcomes for the Psychomotor domain (Bloom Taxonomy)	
Code	Learning Outcome (please underline the verb used)
1. Perception level	
2. Set (mindset) level	
3. Guided response level	
4. Mechanism level	
5. Complex overt responses level	
6. Adaptation level	
7. Origination level	

Table 17: TB3: Learning Object (Design Phase)

TB3: Learning Object		
1	Learning object title	<i>Title of Learning object</i>
2	Learning object code	<i>Enter a code for future reference</i>
3	Learning activity code	<i>Learning activity code belongs to</i>
4	Learning object description	<i>Description of the Learning object (up to 100 words)</i>
5	Language	<i>Language for the specific learning object</i>
6	Learning recourse type (IEEE LOM)	<i>Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object</i> 1. Guidelines 2. Presentation 3. Demonstration 4. Lecture 5. Definition-Principle-Law 6. Narrative Text (theory) 7. Analogy 8. Example 9. Activity <i>Case Study</i> <i>Problem Solving</i> <i>Text Composition</i> <i>Question</i> <i>Else (specify)</i> 10. Simulation <i>Interactive</i> <i>Non Interactive</i> 11. Self-Assessment <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> 12. Experiment 13. Serious Game

		<i>14. Exercise</i> <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> <i>15. Project</i>	
7	Technical type (IEEE LOM)	<i>Definition of the technical type (document, video, wiki etc.) for the specific learning object</i>	
		<i>Text</i>	<i>Document</i> <i>Hypertext</i>
		<i>Image</i>	<i>Photo</i> <i>Map</i> <i>Graph</i> <i>Image</i>
		<i>Streaming media</i>	<i>Audio Recording</i> <i>Animation</i> <i>Self-running Presentation</i> <i>Webcast</i> <i>Video</i>
		<i>Application</i>	<i>Interactive Software</i> <i>Hypermedia Application</i> <i>Wiki</i> <i>Presentation</i>
8	Workload (Estimated study time) (min)	<i>The estimated study time needed for an average learner in minutes</i>	
9	Key words	<i>Key words (3 to 10)</i>	
10	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific learning object (should be a subset of the learning outcomes defined in the corresponded unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>	

11	Extended learning object description	<i>Describe the learning objects in details</i>
----	--------------------------------------	---



Table 18: TB3a: Assessment Object Design and Production (Design Phase)

TB3a: Learning Object (Assessment Object)			
1	Learning object title	Title of Learning (Assessment) object	
2	Learning object code	Enter a code for future reference	
3	Learning activity code	Learning activity code belongs to	
4	Learning object description	Description of the Learning (Assessment) object (up to 100 words)	
5	Language	Language for the specific learning object	
6	Learning recourse type (IEEE LOM)	Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object 9. Activity Case Study Problem Solving Text Composition Question Else (specify) 11. Self-Assessment Multiple Choice Questions Open Type Question Problem Statement Else (specify) 14. Exercise Multiple Choice Questions Open Type Question Problem Statement Else (specify)	
7	Technical type (IEEE LOM)	Text	Document
8	Workload (Estimated study time) (min)	The estimated study time needed for an average learner in minutes	
9	Key words	Key words (3 to 10)	
10	Learning outcomes (LOut)	Record the Learning Outcomes for the specific	

		<i>learning object (should be a subset of the learning outcomes defined in the corresponded unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>
11	Write down the assessment object (quiz)	<i>Use the template below as many times as needed and modify accordingly to specific question type (1 template for each question).</i>

Question template	
No.	
Question (stem)	
Possible answers	
Correct answer	
Response to correct answer	
Response to wrong answer(s)	
Times the question can be taken	
Is the question part of a test?	

Table 19: TB3b: Learning Object Template for Practical Assignments

TB3b: Learning Object (Practical assignments)		
1	Learning object (practical assignments) title	<i>Title of practical assignments</i>
2	Learning object (practical assignments) code	<i>Enter a code for future reference</i>
3	Learning activity (Unit) code	<i>Learning activity (Unit) code belongs to</i>
4	Learning object (practical assignments) description	<i>Description of the practical assignments (up to 100 words)</i>
5	Language	<i>Language for the specific learning object</i>
6	Learning recourse type (IEEE LOM)	<i>Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object (practical assignments)</i> 8. Example 9. Activity Case Study Problem Solving Text Composition Question Else (specify) 15. Project
7	Technical type (IEEE LOM)	<i>Definition of the technical type (document, video, wiki etc.) for the specific learning object (practical assignments)</i> <div> <div>Text</div> <div>Document Hypertext</div> </div>
8	Workload (Estimated study time) (min)	<i>The estimated study time needed for an average learner in minutes</i>
9	Key words	<i>Key words (3 to 10)</i>
10	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific practical assignments (should be a subset of the learning outcomes defined in the</i>

		<i>corresponded unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>
11	Extended practical assignments description	<i>Provide the subject; describe the content of the practical assignment and the expected outcomes. Provide learners with 3 to 5 phrases that constitute the axes for this practical assignments or the methodology that they should follow to deal and answer it.</i>
12	Preparatory / Additional material (literature, further readings)	<i>Provide preparatory materials, which can take the form of references, literature, additional readings (presentation slides, audio lectures or video lectures etc.) needed to deal with this practical assignments.</i>
13	Answer extension (Words quantity)	<i>Expected range of words for the accepted answers</i>
14	Exemplary answer	<i>Provide a brief exemplary answer, describing the key points of subjects or sentences a correct answer should include. Also provide any common wrong answer that trainees are expected to give and the feedback comments that should be given by the trainers. Provide any other information necessary for the trainer to support his role and to be able to grade the answer.</i>

Table 20: TB4: Identification of Learning Outcomes (Design Phase)

TB4: Identification of Learning Outcomes		
PREPARATION	Step 1	<p>Collect data related to the topic of the course or the module and prepare a textual description.</p> <p><i>E.g. Collect data for the curator's job, research associated qualifications and get additional information from a professional curator.</i></p>
	Step 2	<p>Analyze the meaning of every word given and define every unknown term.</p> <p><i>E.g. Analyze the descriptions, especially those that refer to qualifications or competences. Link qualifications with a curriculum that develops curator's related degrees. Research the study guide, find related courses and study the content and purpose of these courses.</i></p>
DEVELOPMENT	Step 3	<p>Differentiate between knowledge, skill and competence; these correspond to different levels in Bloom's taxonomy. Take under consideration the words used in description of outcomes. This will help classification of the learning outcomes in the taxonomy. Describe the domain of the unit (learning activity), extending the 3rd field "Unit Description" of the table TB2. Underline all concepts.</p> <p><i>E.g. In the technical skill "Can create media elements", the verb "can" states capability, as a result there are expected learning outcomes mainly at the higher levels of Application and Synthesis and probably less at levels of Knowledge and Comprehension.</i></p>
	Step 4	<p>Apply the ABCD and SMART approaches to create one learning outcome for each knowledge, skill or competence. For each concept write at least one learning outcome in the desirable Bloom's taxonomy level. Subsequently, write learning outcomes for the Affective and the Psychomotor Domain. Use tables TB2.2, TB2.3, TB2.4.</p> <p><i>E.g. After completing this course, the student will be able to define using 500 words how network theory views social relationships.</i></p>
EVALUATION	Step 5	<p>Evaluate the learning outcomes for clarity, coherence, completeness (with respect to the domain AND to Bloom's taxonomy levels) and ability to be assessed.</p> <p><i>E.g. the above learning outcome adopts both ABCD and SMART approaches; it can be assessed by asking the student to write an essay using 500 words on how network theory views social relationships.</i></p>
	Step 6	<p>Go to step 1 if any of the above conditions is not met and repeat the cycle.</p>

(*) The reader should keep in mind that this template is to facilitate him / her to write (prepare, develop, evaluate) the learning outcomes.

Appendix 2: Supportive documents



Mu.SA MOOC instructions for completing the TB3 and TB3a tables (Design of Learning Objects) + Workload estimation

Regardless of the exact stage you currently are, please consider the instructions below for the correct completion of the TB3 table and TB3a both refer to the Second part of the Design Phase which is the Learning Objects design:

1) You should fill in one TB3 table for each learning (core material), additional and collaboration object and one TB3a table for each assessment object defined in the first part of the design phase.

2) You should fill in all fields provided but you should pay attention to the **field 8** where you should define approximately the **estimated study time (workload) in minutes**.

- The workload for a **textual** learning object depends on the content. In the case of a journal article, it is approximately 3-4 pages an hour; if it is a book chapter then 5 pages per hour are more appropriate. In case the content is even easier increase pages per hour accordingly.
- A safe way to estimate a **video** learning object workload is to double its duration. For example, if the video lasts 4 minutes, the study/comprehension time for the video is 8 minutes approximately.
- The workload of a **hypertext** is the sum of the text itself plus the workload of each object it links to.
- For each **assessment objects** the workload estimation is the accumulation / sum of each individual question's workload this object consists of. Workload for questions of types like "multiple choice" or "fill in the blanks" or "matching" is more or less 5 min (each) and questions of type "yes/no (or true/false)" is more or less 3 min (each).

3) In **field 11** in case you design a learning (or additional or collaboration) object you should include:

a) An Introduction to the object at the beginning, b) a comprehensive description of the contents/concepts separated in sections if necessary and c) a Synopsis at the end. You should also

include any other information you consider necessary for the approval by the scientific reviewers.

Alternatively, if you make a ppt video learning object, you could include your ppt file instead of the above description (if it is ready).

Additionally, in case you design a video learning object you need to include scenes design, the setup of the presenters / speakers, the cameras setup and the script. You should also provide us with any other information you consider necessary in order our video expert sends you feedback and/or comments.

Please notice that content information prior to the production phase is considered crucial in order to avoid possible unnecessary process backtracking.

Important notifications:

- Please notice that each module has different **time effort**. So, e.g. the transferable module should be up to 3 hours which is the total of = time of work study + the time needed for the assessment (after the educational material the trainee should do quizzes, multiple choice questions, self –evaluation exercises etc).
- Assessment objects content should also be approved by the scientific reviewers.

TB3: Learning Object		
1	Learning object title	<i>Title of Learning object</i>
2	Learning object code	<i>Enter a code for future reference</i>
3	Learning activity code	<i>Learning activity code belongs to</i>
4	Learning object description	<i>Description of the Learning object (up to 100 words)</i>
5	Language	<i>Language for the specific learning object</i>
6	Learning recourse type (IEEE LOM)	<i>Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object</i> 1. Guidelines 2. Presentation 3. Demonstration 4. Lecture 5. Definition-Principle-Law 6. Narrative Text (theory) 7. Analogy 8. Example 9. Activity <i>Case Study</i> <i>Problem Solving</i> <i>Text Composition</i> <i>Question</i> <i>Else (specify)</i> 10. Simulation <i>Interactive</i> <i>Non Interactive</i> 11. Self-Assessment <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> 12. Experiment 13. Serious Game 14. Exercise

		<i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> <i>15. Project</i>	
7	Technical type (IEEE LOM)	<i>Definition of the technical type (document, video, wiki etc.) for the specific learning object</i>	
		<i>Text</i>	<i>Document</i> <i>Hypertext</i>
		<i>Image</i>	<i>Photo</i> <i>Map</i> <i>Graph</i> <i>Image</i>
		<i>Streaming media</i>	<i>Audio Recording</i> <i>Animation</i> <i>Self-running Presentation</i> <i>Webcast</i> <i>Video</i>
		<i>Application</i>	<i>Interactive Software</i> <i>Hypermedia Application</i> <i>Wiki</i> <i>Presentation</i>
8	Workload (Estimated study time) (min)	<i>The estimated study time needed for an average learner in minutes</i>	
9	Key words	<i>Key words (3 to 10)</i>	
10	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific learning object (should be a subset of the learning outcomes defined in the corresponded unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>	

11	Extended learning object description	<i>Describe the learning objects in details</i>
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TB3a: Learning Object (Assessment Object)

1	Learning object title	<i>Title of Learning (Assessment) object</i>	
2	Learning object code	<i>Enter a code for future reference</i>	
3	Learning activity code	<i>Learning activity code belongs to</i>	
4	Learning object description	<i>Description of the Learning (Assessment) object (up to 100 words)</i>	
5	Language	<i>Language for the specific learning object</i>	
6	Learning recourse type (IEEE LOM)	<i>Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object</i> 9. Activity <i>Case Study</i> <i>Problem Solving</i> <i>Text Composition</i> <i>Question</i> <i>Else (specify)</i> 11. Self-Assessment <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> 14. Exercise <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i>	
7	Technical type (IEEE LOM)	<i>Text</i>	<i>Document</i>
8	Workload (Estimated study time) (min)	<i>The estimated study time needed for an average learner in minutes</i>	
9	Key words	<i>Key words (3 to 10)</i>	
10	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific learning object (should be a subset of the learning outcomes defined in the corresponded</i>	



		<i>unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>
11	Write down the assessment object (quiz)	<i>Use the template below as many times as needed and modify accordingly to specific question type (1 template for each question).</i>

Question template

No.	
Question (stem)	
Possible answers	
Correct answer	
Response to correct answer	
Response to wrong answer(s)	
Times the question can be taken	
Is the question part of a test?	

Comments on Mu.SA TB3 - Learning object template

Units (learning activities) consist of learning objects. After finalizing the information (technical and scientific reviews) of TB1, TB1.1, TB2, TB2.1, TB2.2, TB2.3, you have to fill in this template (white fields) so many times for each learning object, and send it back to HOU.

TB3: Learning Object		
1	Learning object title	<i>Title of Learning object</i>
2	Learning object code	<i>Enter a code for future reference</i>
3	Learning activity code	<i>Learning activity code belongs to</i>
4	Learning object description	<i>Description of the Learning object (up to 100 words)</i>
5	Language	<i>Language for the specific learning object</i>
6	Learning recourse type (IEEE LOM)	<i>Definition of the learning recourse type (theory, simulation, experiment, etc.) for the specific learning object</i> 1. <i>Guidelines</i> 2. <i>Presentation</i> 3. <i>Demonstration</i> 4. <i>Lecture</i> 5. <i>Definition-Principle-Law</i> 6. <i>Narrative Text (theory)</i> 7. <i>Analogy</i> 8. <i>Example</i> 9. <i>Activity</i> <i>Case Study</i> <i>Problem Solving</i> <i>Text Composition</i> <i>Question</i> <i>Else (specify)</i> 10. <i>Simulation</i> <i>Interactive</i> <i>Non Interactive</i> 11. <i>Self-Assessment</i>

		<i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> <i>12. Experiment</i> <i>13. Serious Game</i> <i>14. Exercise</i> <i>Multiple Choice Questions</i> <i>Open Type Question</i> <i>Problem Statement</i> <i>Else (specify)</i> <i>15. Project</i>	
7	Technical type (IEEE LOM)	<i>Definition of the technical type (document, video, wiki etc.) for the specific learning object</i>	
		<i>Text</i>	<i>Document</i> <i>Hypertext</i>
		<i>Image</i>	<i>Photo</i> <i>Map</i> <i>Graph</i> <i>Image</i>
		<i>Streaming media</i>	<i>Audio Recording</i> <i>Animation</i> <i>Self-running Presentation</i> <i>Webcast</i> <i>Video</i>
		<i>Application</i>	<i>Interactive Software</i> <i>Hypermedia Application</i> <i>Wiki</i> <i>Presentation</i>
8	Workload (Estimated study time) (min)	<i>The estimated study time needed for an average learner in minutes</i>	
9	Key words	<i>Key words (3 to 10)</i>	
10	Learning outcomes (LOut)	<i>Record the Learning Outcomes for the specific learning object (should be a subset of the</i>	

		<i>learning outcomes defined in the corresponded unit (learning activity)). In case you define more learning outcomes than those defined in the relative unit (learning activity) please update appropriately the relative unit learning outcomes field.</i>
11	Extended learning object description	<i>Describe the learning objects in details</i>

1) You should fill in one table for each learning (core material), additional, collaboration and assessment object defined in the first part of the design phase.

2) You should fill in all fields provided but you should pay attention to the field 8 where you should define approximately the estimated study time (workload) in minutes.

3a) In field 11 in case you design a learning (or additional or collaboration) object you should include:

An Introduction to the object at the beginning, a comprehensive description of the contents/concepts separated in sections if necessary and a Synopsis at the end. You should also include any other information you consider necessary for the approval by the scientific reviewers.

Alternatively, if you make a ppt video learning object, you could include your ppt file instead of the above description (if it is ready).

Additionally, in case you design a video learning object you need to include scenes design, the setup of the presenters / speakers, the cameras setup and the script. You should also provide us with any other information you consider necessary in order our video expert send you feedback and/or comments.

Please notice that content information prior to the production phase is considered crucial in order to avoid possible unnecessary process backtracking.

3b) In field 11 in case you design an assessment object (consider assessment objects as tests / quizzes consisting of one or more questions) you should include the design of the questions included in each test (we will provide you with guidelines). Assessment objects content should also be approved by the scientific reviewers.



Scientific Reviewer Check Form Template (MOOC + Specialization Course)

See the accompanying document with the same name.



Scientific Reviewer Check Form for Practical Assignments

See the accompanying document with the same name.



Assessment Objects (Guidelines + Template)

See the accompanying document with the same name.



Transcripts Template

See the accompanying document with the same name.



Educational Video Guidelines

See the accompanying document with the same name.



Structural guidelines for online distance learning textual material

For a document to be useful as an online distance learning resource, it should contain some of the following elements (elements marked with an * are considered mandatory):

1. Elements at the start of the document
 - a. Aim / objectives *
 - b. Learning outcomes *
 - c. Keywords *
 - d. Introduction
 - e. Pre-requisite knowledge
 - f. Table of contents / figures / tables
2. Elements in the body of the document
 - a. Sections / sub sections *
 - b. Tables
 - c. Figures
 - d. Examples
 - e. Case studies
3. Elements at the end of the document
 - a. Synopsis
 - b. List of references
 - c. Glossary
 - d. Further reading

In the following, each of these elements is briefly explained.

Aim / objectives

The aim provides a brief explanation of the general contribution of the document. The objectives specialize the aim using more concrete terms. This element should not exceed 5 lines of text.

Learning outcomes

They describe the knowledge / skills / competences (attitudes) that the student will develop after studying the document. They should be based on Bloom's taxonomy and specialize some of the learning outcomes of the module. Should be introduced as: After studying this resource, you will be able to: (followed by a list of outcomes).

The list should not contain more than 10 outcomes; 5 is a good number.

Keywords

A set of keywords that provide the main terms used in the document. Note that for each of these terms, an explanation should be provided in the text and they could be summarized in the glossary. The first appearance of a term should be easily identifiable (i.e. using boldface). The list should not contain more than 10 terms; 6 is a good number.

Introduction

Introduces the reader to the contents that will follow. Places the resource in context and associates it with any previously learned material (if applicable). Also summarizes the resource contents. Should be used only for medium-sized and long documents (i.e. more than 4 pages). Should not exceed 10% of the total length of the document.

Pre-requisite knowledge

Lists the knowledge and skills which are necessary in order to make optimum use of the resource. May not be used for short or medium-sized documents. Could be part of the introduction. Should not exceed 10 lines of text.

Table of contents / figures / tables

Provides an overview of the content and allows direct access to parts of the document. Should be used only for long documents (i.e. more than 12 pages).

Sections / subsections

Contain the body of the document. Should be structured in paragraphs. Avoid using more than 3 levels. Should be numbered.

Tables, figures and graphs

Tables and graphs are used to summarize and provide an overview text contents. Figures usually amplify or extend the text. Better be

placed within the text or at the marginal space (if enough space is provided); better avoid wrapping text around them. Should be placed within a frame. Should be large enough so to be legible. Should always be numbered and have a caption. When referenced from the text, one should write “in figure 1”, never write “in the following figure”. In case the document will be printed, one should be careful with the use of colors (and the references made to them).

Examples

Are used to contextualize or personalize a part of the document. Should be placed within a frame. Should always be numbered and have a title. When referenced from the text, one should write “in example 1”, never write “in the following example”.

Case studies

Are used to contextualize or personalize a part of the document based on real or imaginary situations. Should be placed within a frame. Should always be numbered and have a title. When referenced from the text, one should write “in case study 1”, never write “in the following case study”.

Synopsis

Is placed at the end of the document and summarizes its contents and the learner’s achievements from studying it. Should be used only for medium-sized and long documents (i.e. more than 4 pages). Should not exceed 5% of the total length of the document.

List of references

Contains the list of resources referenced to in the text. The list should either be numbered or placed in alphabetical order. Use either APA or IEEE style. Make sure that each item in the list is referenced at least once in the text.

Glossary

Lists in alphabetical order the important terms used (or introduced) in the text, with a brief explanation.

Further reading

Provides selected resources (OERs) for further reading. For each resource, provide its reference (using APA or IEEE style) and a brief summary (no more than 5 lines).



Structural guidelines for online distance learning presentations

For a presentation to be useful as an online distance learning resource, it should contain some of the following elements (elements marked with an * are considered mandatory):

1. Elements at the start of the presentation

- a. Title slide *
- b. Aim / objectives *
- c. Learning outcomes *
- d. Keywords *
- e. Table of contents

2. Elements in the body of the presentation

- a. Sections / sub sections *
- b. Tables / Graphs / Figures

3. Elements at the end of the presentation

- a. Synopsis
- b. List of references
- c. Further reading
- d. Presenters' bio
- e. Thank you / Credits *

In the following, each of these elements is briefly explained. It is assumed that each presentation is accompanied by narration.

Title slide (1 slide)

Shows the title of the presentation, together with contextualization information (e.g. module / unit it belongs to). The name(s) of the presenter(s) could also appear here.

Aim / objectives (1 slide)

The aim provides a brief explanation of the general contribution of the presentation. The objectives specialize the aim using more concrete terms. A brief introduction to the topic of the presentation could be provided here, too.

Learning outcomes (1 slide)

They describe the knowledge / skills / competences (attitudes) that the student will develop after watching the presentation. They should be based on Bloom's taxonomy and specialize some of the

learning outcomes of the module. Should be introduced as: After studying this resource, you will be able to: (followed by a list of outcomes). The list should contain about 5 learning outcomes (approximately).

Keywords (1-2 slides)

A set of keywords that provide the main terms used in the document, together with a brief explanation. The list should not contain more than 10 terms; 6 is a good number.

Table of contents (1-2 slides)

Provides an overview of the presentation contents. If the presentation contains sections and sub-section, they should be mentioned here, together with the main slide titles of each. This is an alternative location for a brief introduction to the topic of the presentation.

Sections / subsections

Make up the body of the presentation. In general, the main content of the presentation should be structured in a way that allows it to be viewed in non-sequential (i.e. the student can jump to any subsection) and modular (i.e. the student can stop at the end of a section and continue later) ways. The entire presentation and each section could be preceded by an introduction.

Tables, figures and graphs

Better be placed next to the text, or in a stand-alone slide (no text). Avoid placing text in random positions around graphical elements. Should be large enough to be legible.

Synopsis (1 slide)

Is placed at the end of the presentation and summarizes its contents and the learner's achievements from watching it.

List of references (1 slide)

Contains the list of resources used in the presentation. Use either APA or IEEE style. Even if references are also placed in the slides that make up the body of the presentation, they should be summarized at the end as well.

Further reading (1 slide)

Provides selected resources (OERs) for further reading. For each resource, provide its reference (using APA or IEEE style) and a brief summary (no more than 5 lines).

Presenters' bio (1 slide per presenter)

Ideally, the presenters should present themselves. This can be done either in the beginning (i.e. after the title slide) or at the end of the presentation. A short textual bio with a photo should be shown, while each presenter speaks briefly about him/herself in first person (i.e. Hello, I am ... and, in this presentation, we shall ... - tenses should be adapted accordingly).

Thank you / Credits (1 slide)

Thanks the student for watching the presentation. Shows the names of the contributors to the presentation (i.e. author(s), narrator(s), visual effects creator(s), musical score author(s) etc.) and contact details if further communication from the student is necessary. Also shows the licensing mode and takes into account the EU publication requirements.



Guidelines to select OER for the Mu.SA Project

See the accompanying document with the same name.



Presentation Learning Object Template

See the accompanying document with the same name.



Learning Object Description Template

See the accompanying document with the same name.



Practical assignments (types)

Project

With the term “Project”, or “creative and synthetic work” we mean a small or large scale, group or individual work, which, through a cross-thematic approach, urges and supports the learner in the interdisciplinary study of a specific subject. The project is based on the core pedagogical principles of self-learning, participatory learning, in-depth and collaborative learning. Through a process of study, research, evaluation, and critical synthesis of resources, the trainee learns how to learn.

Example

Example is a specific (characteristic, representative) and well defined case that clarifies a concept, a rule, a pattern, a method or a process.

Activity

Activities suggest the learner to study a topic and deepen his / her knowledge and understanding to that, enable the learner to apply what he / she has learned, assist him / her to the memorization and exploitation of his / her experiences, and help him / her to link them to the subject under study, gaining control of the knowledge he / she has acquired.

For activities usually (unlikely to what is required for the self-assessment exercises), there is no single correct answer (or course of action of the learner) accepted for all learners. It is neither possible for the author of the material to provide all the possible answers and all the possible mistakes of the learners, in order to discuss them under a template answer. This is the main difference between activities and self-assessment exercises. This, of course, does not mean that the activities must stay unanswered by the author. The author of the material should always provide a typical correct answer or provide the key points of subjects or sentences a



correct answer should include, when this is not possible, a description of the actions the learner should follow in order to implement correctly the activity.

Activity: Case Study

Case study is an extensive example that describes an actual case where the learner learns (or could learn) what has learned in practice. It starts with a description of the facts of the case, followed by a critical analysis of how it was implemented in practice what the learner learned, and a description of alternative ways of dealing with the situation. Critical analysis and / or description of alternative ways of coping are requested by the learner, depending on the purpose of the case study. Case studies consider an important learning tool that helps the learner to consolidate existing or new knowledge developed.

A case study can be exploited in two ways:

- a. Consolidate existing and / or apply the knowledge developed,
- b. Stimulate the heuristic process towards learning, when the acquisition of the required knowledge has not yet been completed.

In both cases, conclusions are drawn based on the study of the specific case, or at least assumptions are developed for the knowledge under study in its totality.

Activity: Problem solving

Problem solving focuses to the presentation of a real or hypothetical problem of direct interest to the learners, involving them in their analysis and in finding solutions, urging them in parallel to work out ways to implement the solution they have chosen.



Activity: Text composition

The text composition activity describes a subject and asks the learners to study and criticize texts – that are provided to them, or they asked to search for them and choose – in order to compose their own documented text for the description / analysis / interpretation / processing of the topic under study.

Activity: Open type question

An open-ended question that usually requires a wider and more complex treatment for its response than a question in self-assessment exercises.



Appendix 3: Learning outcomes for instructional design



Introduction

Adopting learning outcomes in the educational or training process serves the shift of the traditional approach oriented to the teachers towards an approach oriented to the learner. In the former strategy, teachers were responsible to select both the instructional strategy and the content. The course descriptions consisted of the content that would be used in lectures – or in other forms – while assessment focused on how well the learners assimilated this content. The “learner-centred” model adopts an “outcome-based” approach, focusing on what the learners will learn, master and be able to do as they progress through the course.

According to the European Qualifications Framework (2017)²¹,

- *Qualification* means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards.
- *Learning outcomes* means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy.
- *Knowledge* means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of EQF, knowledge is described as theoretical and / or factual.
- *Skills* means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

²¹ Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning (2017/C 189/03).



- *Responsibility and autonomy* means the ability of the learner to apply knowledge and skills autonomously and with responsibility.
- *Competence* means the proven ability to use knowledge, skills and personal, social and / or methodological abilities, in work or study situations and in professional and personal development.

Especially for learning outcomes, the following guidelines apply when developing them,

- Use the ABCD / SMART approaches in writing the learning outcomes.
- Each learning outcome should refer to one and only level in Benjamin Bloom's taxonomy.
- Each learning outcome should contain one and only one action verb; use the list of verbs associated with each level in the taxonomy.
- Each learning outcome should contain one concept of the knowledge domain.
- The learning outcomes must be observable, measurable and capable of being assessed.
- Avoid complicated sentences. If necessary use more one than one sentence to ensure clarity.
- Avoid vague terms like know, understand, learn, be familiar with, be exposed to, be acquainted with, and be aware of. These terms are associated with teaching objectives rather than learning outcomes.
- Bear in mind the timescale within which the outcomes are to be achieved and the available resources. There is always the danger that one can be over-ambitious when writing learning outcomes.
- Before finalizing the learning outcomes, evaluate them with colleagues and students.

Writing learning outcomes

Writing learning outcomes with emphasis on correctness and quality requires the employment of particular techniques, like the ABCD and SMART approaches. Additionally, they must address – exclusively and separately – one of the levels identified in the Bloom taxonomy^{22 23}, i.e. *the Cognitive (knowledge-based), the Affective (emotion-based) and the Psychomotor (action-based)* domains. Two main approaches are used to write learning outcomes; the ABCD and the SMART approach. The author of learning outcomes may select the most convenient for him / her to use.

The ABCD approach

Back on 1984, Mager²⁴ argued that learning objectives should be specific and measurable in order to guide appropriately instructors and learners. In this regard, he introduced the ABCD approach in writing them, which included four main elements: **A**udience, **B**ehavior, **C**ondition and **D**egree of mastery. The description for each is presented below²⁵.

Audience (A)	Determines who will master the outcome. A very common way to begin a learning outcome is: "The learner will be able to...". Typical questions used are "Who? Who are your learners?".
Behavior (B)	Identifies what a learner is expected to be able to perform as a result of achieving the learning outcome, or, in other words, how will the learner demonstrate achievement of the outcome. Typical questions used are "What? What do

²² Bloom, B. S.; Engelhart, M. D.; Furst, E. J.; Hill, W. H.; Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York: David McKay Company.

²³ Bloom, B.S., Masia, B.B. and Krathwohl, D. R. (1964). Taxonomy of Educational Objectives Volume II: The Affective Domain. New York: McKay.

²⁴ Mager, R. F. (1984). Preparing instructional objectives, 2nd edition. Belmont, California: Pitman Learning.

²⁵ The ABCD Method of Writing Measurable Objectives.

https://www.cusoeprofessionaleducation.org/uploads/2/9/5/8/29585257/writig_objectives_abcd2014.pdf



	you expect the learners to be able to do?"
Condition (C)	Describes the important conditions (if any) under which learner's performance is to occur. Typical questions include "How? Under what conditions or context will the learning occur? What will the learner be given or already be expected to know to accomplish learning?"
Degree of mastery (D)	Wherever possible, describes the criterion of acceptable performance by describing how well the learner must perform in order to be considered acceptable. Typical questions include "How much? How much will be accomplished, how well will the behavior need to be performed, and to what level?"

The reader should keep in mind the following when writing learning outcomes following the ABCD approach.

- The *verb* used to describe a desirable behavior in a learning outcome must come from / comply with the Bloom's taxonomy (Cognitive, affective, psychomotor domains). This verb must describe a behavior that is observable. However, take into account that a performance can be overt or covert:
 - An overt performance can be observed directly, whether that performance is visible or audible.
 - A covert performance cannot be observed directly; it may be mental, invisible, cognitive, or internal. A covert performance can be used as a learning outcome as long as there is a direct way determining whether it satisfies the outcome.
- The specification of *condition* should be detailed enough so that another competent person would recognize the desired performance. Typical questions include, "What will the learner be allowed to use?", "What will the learner will be denied to use?", "Under what conditions the desired performance is expected to occur?", "Are there any skills that the learner specifically should not develop?"
- Indicators of degrees of mastery (performance) include the time limits, accuracy, quality, etc. By specifying the acceptable level



of performance for each outcome, one has the means for determining whether instruction is successful. Both the teacher and the learner would know the quality of performance they have to work for

Examples of well written outcomes are:

- **Given a verb in the present tense, the learner will be able to re-write the verb in future tense with no more than two errors in tense.**
- **Given 2 hours of study, the learner will solve 4 out of 5 problems of bandwidth allocation.**
- **Given a map of Europe, the learner will be able to list 5 major rivers in 2 minutes.**

The SMART approach

SMART²⁶ stands for **S**pecific, **M**easurable, **A**ttainable (or **A**ction-oriented), **R**elevant, and **T**ime-Bound.

Specific	The learning outcome should be clear and well defined, describing the knowledge, skills and competences that a learner should be able to demonstrate following exposure to a learning activity
Measurable	Achievement of learning objectives can be measured through benchmarks or targets by specific evaluation methods during or after the session
Attainable (Action-oriented)	The objective includes an action verb that demonstrates change or acquisition of knowledge, skills or competences
Relevant	The objective reflects relevant expectations of knowledge, skills and competences acquisition/change given the conditions for instruction
Time-bound	The objective specifies a time frame in which learners are expected to achieve the learning objective(s)—usually by the end of the session

²⁶ Anderson, L. & Krathwohl, D., et al. (2001). A Taxonomy for Learning, Teaching, and Assessing: a revision of Bloom's taxonomy of educational objectives, New York : Longman.



Examples of SMART learning outcomes are:

- **Following this session, participants will describe four measures** that **can protect against lung cancer**.
- **After attending the lecture and studying chapter 2, learners will list the three domains of Bloom's taxonomy**.
- **By the end of this course, the learner will become proficient in Microsoft Excel by creating financial spreadsheets** to be used to **conduct museum's financial analyses**. The supervisor will evaluate his spreadsheets and written analysis.

The Bloom Taxonomy

The aforementioned approaches to writing learning outcomes are based on the work of Benjamin Bloom, who identified three domains of learning – cognitive, affective and psychomotor – each of which is organized as a series of levels or prerequisites. The three domains can be defined as follows:

Cognitive: it is the most widely used of the three domains. It refers mostly to knowledge structures and contains a classification (or taxonomy) of thinking behaviors from the simple recall of facts up to the process of analysis and evaluation ²⁷.

Affective: it refers to the way we deal with things emotionally, such as feelings, values, attitudes, motivations, etc., and ranges from mere awareness through to being able to distinguish implicit values through analysis ²⁸.

Psychomotor: it mainly emphasizes physical skills involving co-ordination of the brain and muscular activity and it prevails in areas like laboratory science subjects, health sciences, art, music, engineering, drama and physical education. Bloom and his

²⁷ Anderson, Lorin W.; Krathwohl, David R., eds. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Allyn and Bacon. ISBN 978-0-8013-1903-7.

²⁸ http://www.nwlink.com/~donclark/hrd/Bloom/affective_domain.html



colleagues never created levels in this domain, though other researchers later did, like Dave (1970)²⁹ and Simpson (1972)³⁰.

Each of these domains is further analysed in the following sections.

Cognitive domain

Bloom and his colleagues advanced their work mainly in the cognitive domain, as this is required in the majority of cases. They produced a hierarchical framework through one (learner) may build upon prior learning and upscale its knowledge. Apart from other purposes, it is used extensively to write learning outcomes providing the foundations for developers. Its ready-made structure, in conjunction with the provided (list of) verbs, facilitates significantly the writing of learning outcomes.

Bloom's taxonomy of cognitive domain consists of the following six levels (Bloom et al, 1956²², Kennedy et al, 2006³¹):

1. **Knowledge:** the ability to recall or remember facts without necessarily understanding them. Some of the action verbs used to assess knowledge are: *Arrange, collect, define, describe, duplicate, enumerate, examine, find, identify, label, list, memorize, name, order, outline, present, quote, recall, recognize, recollect, record, recount, relate, repeat, reproduce, show, state, tabulate, tell.*
2. **Comprehension:** the ability to understand and interpret learned information. Some of the action verbs used to assess comprehension are: *Associate, change, clarify, classify, construct, contrast, convert, decode, defend, describe, differentiate, discriminate, discuss, distinguish, estimate, explain, express, extend, generalize, identify, illustrate, indicate,*

²⁹ Dave, R. H. (1970). Developing and Writing Behavioural Objectives. (R J Armstrong, ed.) Tucson, Arizona: Educational Innovators Press.

³⁰ Simpson, E. (1972). The classification of educational objectives in the psychomotor domain: The psychomotor domain. Vol. 3. Washington, DC: Gryphon House.

³¹ Kennedy, D., Hyland, A. and Ryan, N. (2006). Writing and using learning outcomes: a practical guide. Article C 3.4-1 in Eric Froment, Jürgen Kohler, Lewis Purser and Lesley Wilson (eds.): EUA Bologna Handbook – Making Bologna Work (Berlin 2006: Raabe Verlag)

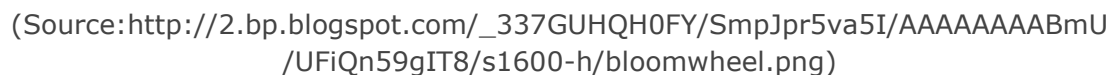


infer, interpret, locate, paraphrase, predict, recognize, report, restate, rewrite, review, select, solve, translate.

3. **Application:** the ability to use learned information (i.e. ideas and concepts) to solve problems in new situations. Some of the action verbs used to assess application are: *Apply, assess, calculate, change, choose, complete, compute, construct, demonstrate, develop, discover, dramatize, employ, examine, experiment, find, illustrate, interpret, manipulate, modify, operate, organize, practice, predict, prepare, produce, relate, schedule, select, show, sketch, solve, transfer, use.*
4. **Analysis:** the ability to break down information into components and understand organizational structure (i.e. look for inter-relationships). Some of the action verbs used to assess analysis are: *Analyze, appraise, arrange, break down, calculate, categorize, classify, compare, connect, contrast, criticize, debate, deduce, determine, differentiate, discriminate, distinguish, divide, examine, experiment, identify, illustrate, infer, inspect, investigate.*
5. **Synthesis:** may be defined as the ability to combine parts together. Some of the action verbs used to assess synthesis are: *Argue, arrange, assemble, categorize, collect, combine, compile, compose, construct, create, design, develop, devise, establish, explain, formulate, generalize, generate, integrate, invent, make, manage, modify, organize, originate, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize.*
6. **Evaluation:** may be defined as the ability to judge the value of information for a given purpose or situation. Some of the action verbs used to assess evaluation are: *Appraise, ascertain, argue, assess, attach, choose, compare, conclude, contrast, convince, criticize, decide, defend, discriminate, explain, evaluate, grade, interpret, judge, justify, measure, predict, rate, recommend, relate, resolve.*



Level 3: Application	Construct the conceptual model of a database using the entity relationship model .
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When writing learning outcomes for the cognitive domain, it is suggested that:

- One should try to include learning outcomes for all levels of the taxonomy.
- One should try to avoid overloading the list with outcomes which are drawn from the lower levels of the taxonomy.
- One ought not to try to address higher levels until those below them have been covered (the taxonomy is effectively serial in structure).

Affective domain

In order to describe the way in which we deal with things emotionally, Bloom and his colleagues developed five major categories³²:

1. **Receiving:** refers to a willingness to receive information, e.g. the individual accepts the need for a commitment to service, listens to others with respect, shows sensitivity to social problems, etc. *Verbs / keywords: Acknowledge, ask, attentive, courteous, dutiful, follow, give, listen, understand.*
2. **Responding:** refers to the individual actively participating in his or her own learning, e.g. shows interest in the subject, is willing to give a presentation, participates in class discussions, enjoys helping others, etc. *Verbs / keywords: Answer, assist, aid, comply, conform, discuss, greet, help, label, perform, present, tell.*
3. **Valuing:** ranges from simple acceptance of a value to one of commitment, e.g. the individual demonstrates belief in democratic processes, appreciates the role of science in our everyday lives, shows concern for the welfare of others, shows sensitivity towards individual and cultural differences, etc. *Verbs / keywords: Appreciate, cherish, treasure, demonstrate, initiate, invite, join, justify, propose, respect, share.*
4. **Organization:** refers to the process that individuals go through as they bring together different values, resolve conflicts among them and start to internalize the values, e.g. recognizes the need for

³² Verbs / keywords retrieved from [Bloom's Taxonomy: The Affective Domain](#).

balance between freedom and responsibility in a democracy, accepts responsibility for his or her own behavior, accepts professional ethical standards, adapts behavior to a value system, etc. *Verbs / Keywords: compare, relate, synthesize.*

5. **Characterization:** at this level the individual has a value system in terms of their beliefs, ideas and attitudes that control their behavior in a consistent and predictable manner, e.g. displays self-reliance in working independently, displays a professional commitment to ethical practice, shows good personal, social and emotional adjustment, maintains good health habits, etc. *Verbs / keywords: act, discriminate, display, influence, modify, perform, qualify, question, revise, serve, solve, verify.*

Psychomotor domain

As detailed earlier, the psychomotor domain mainly emphasizes physical skills involving co-ordination of the brain and muscular activity; in practice, it prevails in areas like laboratory science subjects, health sciences, art, music, engineering, drama and physical education. Bloom and his colleagues never created levels in this domain, though other researchers later did, like Dave (1970)²⁹ and Simpson (1972)³⁰ did.

Dave (1970) proposed a hierarchy consisting of five levels:

1. **Imitation:** observing the behaviour of another person and copying this behaviour. This is the first stage in learning a complex skill.
2. **Manipulation:** ability to perform certain actions by following instructions and practicing skills.
3. **Precision:** ability to carry out a task with few errors and become more precise without the presence of the original source. The skill has been attained and proficiency is indicated by smooth and accurate performance.
4. **Articulation:** ability to co-ordinate a series of actions by combining two or more skills. Patterns can be modified to fit special requirements or solve a problem.
5. **Naturalization:** displays a high level of performance naturally ("without thinking"). Skills are combined, sequenced and performed consistently with ease.

Subsequently, Simpson (1972) developed a more detailed hierarchy consisting of seven levels³³:

1. **Perception:** ability to use observed cues to guide physical activity. *Verbs: Choose, describe, detect, differentiate, distinguish, identify, isolate, relate, select.*
2. **Set (mindset):** readiness to take a particular course of action. This can involve mental, physical and emotional disposition. *Verbs / keywords: Begin, display, explain, move, proceed, react, show, state, volunteer.*
3. **Guided response:** attempts at acquiring a physical skill, which lead to better performance. *Verbs / keywords: Copy, trace, follows, react, reproduce, respond.*
4. **Mechanism:** the stage where earned responses become more habitual and movements can be performed with some confidence and level of proficiency. *Verbs / Keywords: Assemble, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch.*
5. **Complex Overt Responses:** refers to physical activities involving complex movement patterns. Responses are automatic and proficiency is indicated by accurate and highly coordinated performance with a minimum of wasted effort. *Verbs / Keywords: Assemble, build, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch. These verbs / keywords are the same with the level "Mechanism" but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc.*
6. **Adaptation:** at this level, skills are well developed and the individual can modify movements to deal with problem situations or to fit special requirements. *Verbs / keywords: Adapt, alter, change, rearrange, reorganize, revise, vary.*
7. **Origination:** creativity for special situations is possible because the skills are so highly developed. *Verbs / keywords: Arrange, build, combine, compose, construct, create, design, initiate, make, originate.*

³³ Verbs / keywords retrieved from [Bloom's Taxonomy: The Psychomotor Domain](#).



The Mu.SA methodology for writing learning outcomes

Taking into account the previous theories, methods and approaches, the Mu.SA partnership adopts the following steps to write learning outcomes:

- **Step 1:** Collect data related to the topic of the course or the module and prepare a textual description.
- **Step 2:** Analyze the meaning of every word given and define every unknown term.
- **Step 3:** Differentiate between knowledge, skill and competence; these correspond to different levels in Bloom's taxonomy.
- **Step 4:** Apply the ABCD and SMART approaches to create one learning outcome for each knowledge, skill or competence.
- **Step 5:** Evaluate the learning outcomes for clarity, coherence, completeness (with respect to the domain AND to Bloom's taxonomy levels) and ability to be assessed.
- **Step 6:** Go to step 1 if any of the above conditions is not met and repeat the cycle.

Note that steps 1 and 2 belong to the Preparation phase, steps 3 and 4 belong to the Development phase, whereas steps 5 and 6 belong to the Evaluation phase.

ACTION

Please fill in the template labeled

- TB4: Identification of Learning Outcomes (Design Phase) (Appendix 1).