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# Evaluating OERs in Museum Education Context

## A Collaborative Online Experience

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This paper aims to present the results of a higher education experience promoted by the research centres INTELLECT (University of Modena and Reggio Emilia) and CDM (University of Roma Tre), as part of difference master's degrees programme of the academic years 2018/2019, 2019/2020, and 2020/2021. Through different online activities, 37 students attended and evaluated a MOOC on museum education content, such promoting their professionals and transverse skills, such as critical thinking, and developing their knowledge relative to OERs, within culture and heritage education contexts. Moreover, results from the online evaluation activities support the implementation of the MOOC in a collaborative way: during the academic years, evaluation data have been used by researcher to make changes to the course modules, thus realizing a more effective online path from an educational point of view.

## 1 Introduction

The use of MOOCs and OERS in the field of heritage education has considerably increased in the last decade, especially in the last year due to the spread of the COVID-19 pandemic [2]. One of the reasons why MOOCs are so interesting for museum institutions is the possibility to reach a large number of users, including online, and to promote the communication of artistic and cultural heritage. For example, in 2013 the New York MOMA designed and released a MOOC intended for museum operators and professionals, which was attended by around 17,000 people from all over the world [1, 3]; in 2015, the Museum Studies Centre of the University of Leicester created the "Behind the Scenes at the 21st Century Museum" MOOC, the first example of an online course created with the support of a museum institution, the National Museums Liverpool, thus highlighting the

efficacy of such a didactic methodology for the development of content relative to the field of museum and university didactics.

The spread of OERs and MOOCs in the field of museum education imposes the need for educators to engage with such didactic tools and to reach as deep an understanding of this phenomenon as possible, so as to develop their professional knowledge and skills and, at the same time, the transverse skills of analysis, creativity, collaboration and critical evaluation, which are to a greater extent connected to such learning resources. Moreover, the recent Italian ministerial regulations in education, through the “Guidelines for Integrated Digital Education” (2020) and the “Digital School National Plan” (law 170/2015), define as necessary the creation by teachers of educational pathways which employ OERs and which can integrate online content to educational activities according to the learner education needs. Therefore, training courses in this field are pivotal, both for in-training teachers and educators that intend to enter the formal or informal education context, as well as for educators and teachers that are already part of the workforce.

Starting from these assumptions, the Centre for Museum Studies (CDM) based at the Department of Education, University of Roma Tre, designed and implemented a series of online activities for students of the Pedagogical Science degree of the a. y. 2018/2019, 2019/2020 and 2020/2021 in which participants had the opportunity to study the characteristics of OERs, such as MOOCs, in the formal and informal education field, and to discover their potentialities for the promotion of the artistic and cultural heritage, thus developing professional and transverse knowledge and skills in the field of distance learning and museum education, as contents of the course. Moreover, thanks to the support of researcher from the INTELLECT centre (Research centre for Education of Museum Heritage, Wellbeing and Teaching Technology), data from the online evaluation activities, done by students, were analysed in order to obtain useful suggestions for the MOOC implementation, thus realizing a more effective online path from an educational point of view.

## **2 MOOC Design and First Evaluation Activity**

The MOOC “Museum Education: teaching methodologies for the promotion of transverse skills in heritage context” was developed in the academic year 2016/2017 by about 70 students of the bachelor’s degree in Educational Science, during the “Museum education and critical technology” blended internship organised by CDM. The 50-hour-long internship, carried out through distance and face-to-face activities, allowed the design and creation of a MOOC in museum education addressed to primary school teachers, educators and museum operators. The MOOC

was planned and realized by ten groups of students: each group was assigned a module from the course and it had to create the following OERs:

- lecture notes containing the study materials;
- an introductory video on the topics of the module;
- an assessment test consisting of ten close-ended questions.

The modules of the MOOC were divided into ten different topics; the group number two was not able to complete the requested activities at the end of the blended internship course; therefore, the final MOOC consists of nine modules.

All the materials produced by the students' groups were evaluated through a specific evaluation tool [3]; moreover, the OERs produced were also assessed by the internship tutors, who afterwards appointed group number nine as the best group in the activity.

In September 2018, the MOOC "Museum Education: teaching methodologies for the promotion of transverse skills in heritage context" was reviewed taking into consideration the results of the first evaluation phase. The process of revision was aimed at implementing the contents of the OERs, correcting any mistakes, reviewing the evaluation tests and the video material produced.

The MOOC was modified and implemented, with the final structure as follows:

1. What is a museum;
2. Heritage education and transverse skills development;
3. Museum education methodologies 1: Object-Based Learning;
4. Object-Based Learning at the museum: an example of best practice;
5. Museum education methodologies 2: Digital storytelling;
6. Digital storytelling at the museum: an example of best practice;

In October 2018, the course was uploaded on the CDM Moodle platform (<https://centrodidatticamuseale.it/didatticamuseo/>), which is completely accessible and free. Starting from the 23th October 2018, students of the Master's Degree in Pedagogical Science had the opportunity to access the platform and begin to study the various modules of the MOOC.

### 3 Second Evaluation Activity: Aims and Methodology

During the academic years 2018/2019, 2019/2020 and 2020/2021, in total 37 students attended the MOOC “Museum Education: teaching methodologies for the promotion of transversal skills in heritage context” through the CDM Moodle Platform. In addition to studying the lecture notes, watching videos and evaluating the acquired knowledge through an assessment test, students were asked to rate the contents and characteristics of each module (6 modules in total) by using an evaluation tool especially created for the experience. This evaluation activity aimed students to analyse OERs in a critical way, promoting specific professional skills in the field of online education and transverse skills, such as critical thinking and digital skills.

The aims of the students’ education experience are the following:

- allowing university students to participate in a MOOC on museum education content;
- allowing students to use a MOOC evaluation tool specifically realized for education activity;
- evaluate the effect of MOOCs and the related evaluation activities in the promotion of students’ transverse skills.

### 4 The Evaluation Tool

The evaluation tool of the MOOC modules, used during the last 3 academic years, was released to stimulate the students’ analysis and reflection skills, and their ability to critically evaluate the online educational resources (OERs). The tool was based on previous evaluation tools created for the development of critical thinking through evaluation activities. The main studies taken into account to create the research tool were the works of Wright [6], Yousef, Chatti, Schroeder, and Wosnitza [7], and Poce, Agrusti, and Re [4].

The tool is composed of five questions based on the Likert scale that aim to examine the following indicators [5]:

The first macro-indicator aims to assess the structure of the Sub-MOOC in terms of learning pathway design. The second macro-indicator allows participants to self-assess the transverse competences solicited within the Sub-MOOC under evaluation. The third macro-indicator aims to assess the quality of learning in terms of expectation and clarity of learning instructions. The fourth macro-indicator focuses on the technical aspects of the OERs, such as the sound of the videos

**Table 1:** Evaluation tool indicators

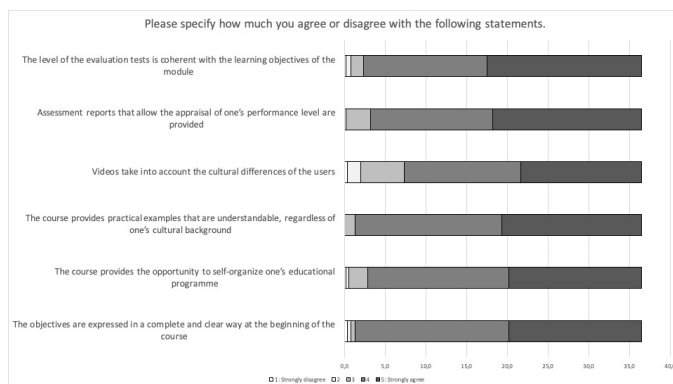
Macro Indicator	Indicator	Likert scale
Instructional Design Category – Module Organization	Clarity of objectives	1: Strongly disagree
	Self-regulation promotion	–
	Practical examples	5: Strongly agree
	Cultural differences within videos	
	Assessment reports	
	Test consistency	
Self-evaluation skills promotion	Creativity	1: No incentive
	Innovation	–
	Communication	5: Maximum incentive
	Analysis	
	Evaluation	
	Argumentation	
	Metacognition	
	Problem solving	
	Memory	
	Aptitude for research	
Entrepreneurship		
Self-evaluation learning	Expectations in learning	1: Strongly disagree
	Gradualness of learning	–
	Clarity of learning path	5: Strongly agree
	Quality of learning instructions	
	Number of learning instructions	
	Learning contents	
User Interface and Video Content	Search functions	1: Strongly disagree
	Sound quality	–
	Resources complexity	5: Strongly agree
	Sentences complexity	
	Users engagement	
Sub-MOOC Content quality	Ease of understanding	1: Minimum Quality
	Ease of memorisation	–
	Clarity of content	5: Maximum Quality
	Clarity of the language used.	
	Duration of use.	
	Exhaustiveness of content.	
	Multimedia of content.	

and the accessibility of the online resources. The fifth and last macro-indicator allows participants to evaluate the clarity, comprehensiveness and multimedia of the contents in relation to the Sub-MOOC educational objectives.

To access the evaluation questionnaire of each module, the student involved in the online activity had to have previously studied the lecture notes, watched the video and completed the assessment test related to the module evaluated.

## 5 Evaluation Results

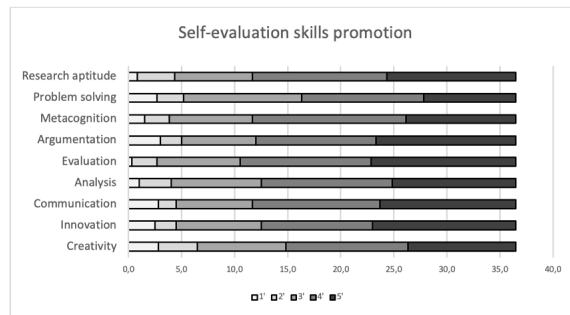
Since the academic year 2018/2019, 37 students (M = 6, F = 31) from the Masters' degree in Pedagogical Sciences have completed the MOOC and the evaluations of each module of the course. The evaluation data on the first macro indicator (Instructional Design Category - Module Organization) are very positive (Figure 1). The average scores assigned to *Assessment reports* and *Test consistency* indicators are quite high: on average, 19 out of 37 students strongly agree with "The level of the evaluation tests is coherent with the learning objectives of the module" statement and give high marks to the quality of evaluation reports provided during module activities. Even the indicators of *Clarity of objectives* and *Self-regulation promotion* also have good ratings: learning objectives are defined quite clearly in the MOOC by 19 students. The presence of practical examples of the use of specific teaching methodologies in the context of artistic and cultural heritage is particularly appreciated by students; moreover, they can be fairly well understood by everyone, regardless of cultural background, by 18 participants out of 37.



**Figure 1:** Comparative histogram of the average scores assigned to the instructional design indicator (N = 37)

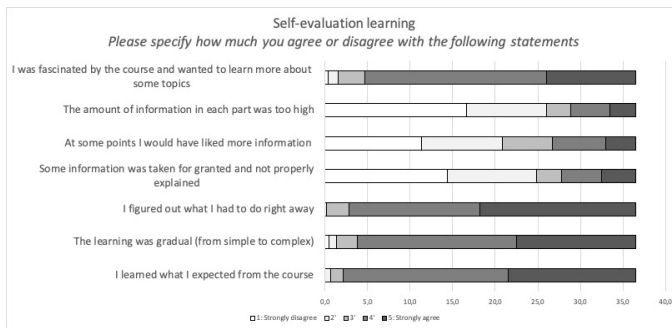


The macro-indicator *Self-evaluation skills promotion* shows very satisfactory evaluation data for almost all the transverse skills mentioned (Figure 2). The *Evaluation* and *Innovation* skills receive on average the highest scores: 24 students score the innovation competence 5 or 4, while 26 students score the evaluation competence 5 or 4. The achievement of these evaluation results with reference to these skills, ascribable to the construct of Critical Thinking (see *Novelty* and *Critical Evaluation* indicators in Poce, 2017), makes explicit the attainment of the online course's objectives by the students, who self-assess in a very positive manner the promotion of their mental dispositions (Facione, 1990). The *Communication* skills are also evaluated positively: students state that the MOOC activities, especially modules 1 and 2, promoted communication skills, encouraging the acquisition of the specialized language of museum education (st.dev. = 1.20). *Creativity* also achieves quite high evaluation results (on average, score of 4 for 12 students and score of 5 for 10 students), highlighting the students' awareness of the acquisition of new skills and content, one of the priority objectives of the online activity. The lowest self-evaluation scores were given to the *Problem solving*: on average, 11 students assigned the score 3 to this skill. The low perception of the promotion of the *Problem solving* skill could be due to the absence of individual and group activities based on problem solving methodologies in the field of museum and heritage education, and this provides researchers with an important direction for the future implementation of the MOOC. It is important to highlight that some results of the self-assessment of transversal skills are closely related: specifically, *Innovation* skills show a strong positive correlation with *Creativity* skills ( $r = 0.83$ ) and *Communication* skills ( $r = 0.83$ ). These data are significant in relation to the educational objectives of the MOOC and provides important information about the educational effectiveness of the learning pathway.



**Figure 2:** Average of the scores assigned to the modules of the MOOC in terms of “self-evaluation skills promotion” (N = 37)

The results of the learning self-evaluation learning process are also fully satisfactory (Figure 3): students declare that the indications provided are always clear and in line with the objectives of the module (on average, 34 students out of 37) and acquisition of knowledge were almost always gradual (on average, 32 students out of 37), preventing in this way the arising of difficulties due to the excessive complexity of the contents provided. The indications concerning the activities were very clear, obtaining an average of the scores assigned to 5 by 18 students. The evaluation assigned to the indicator *Number of learning instructions* reveals how further implementations must be made about the quantity of contents proposed in the course: on average, 10 students quite or completely agree that more indications regarding online activities would have been needed.

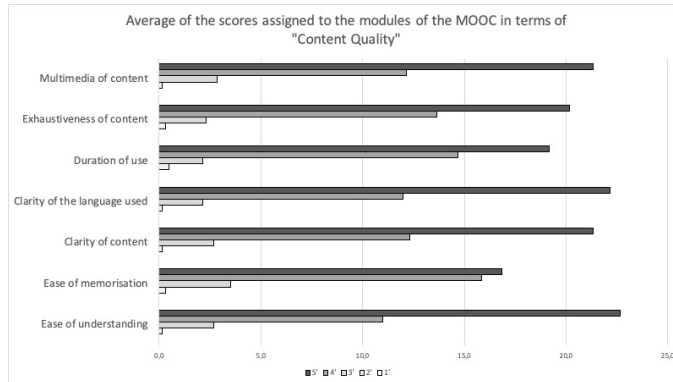


**Figure 3:** Average of the scores assigned to the modules of the MOOC in terms of “self-evaluation learning” (N = 37)

The User Interface and Video Content macro-indicator presents important evaluation results for the implementation of the MOOC: students declare the need to activate a content search function not only within the text but also in the videos and in the assessment tests, so as to view specific contents more quickly. While the results related to the *sound quality* are quite satisfactory (on average, 20 students assign the maximum score to this indicator), the level of syntactic complexity should be reduced for 15 out of 37 students, in order to facilitate the understanding of the content delivered through different OERs. Generally, the level of complexity of the proposed topic is assessed positively in relation to the MOOC target users (on average, 34 students out of 37 agree with this statement).

The Sub-MOOC Content quality achieved the evaluations with the highest average scores: the lecture notes, videos and evaluation tests are easy to understand and memorise, clear in form and content, exhaustive and with good interactive

and multimedia contents for the most of students participating in the MOOC. In general, 23 and 22 out of 37 students give the highest score respectively to the indicators of *Ease of understanding* (St.dev = 0.67) and *Clarity of the content* (St.dev = 0.66)



**Figure 4:** Average of the scores assigned by participants to the "content quality" macroindicator (N = 37)

## 6 Conclusion

The educational experience presented here proposes an innovative methodology that promotes professional and transverse skills, especially critical thinking, in students of a Master's degree course through online activities. The opportunity to participate in a MOOC on museum education and to evaluate it through a specific evaluation tool has allowed students to deepen their specific knowledge of museum education and to enhance skills and abilities, both those more directly related to teaching and educational activity, such as pedagogical reflection and the evaluation of learning material, and those that can be defined as transversal, such as innovation, creativity, communication and argumentation.

In addition, the designed activities through different academic years allowed the realisation of a MOOC with the collaboration of university students who participated in both the first design and evaluation phase, providing interesting stimuli for the implementation of OERs, such as videos and texts technical implementation or introduction of new type of e-learning activities.

Indeed, the evaluation results of the MOOC modules, suggested by the “evaluators” students, will be used in the second revision phase of the course, starting in 2021, with the aim to enlarge the number of users thanks to the collaboration of the INTELLECT research centre. The small number of students employed in the experience described here imposes the need for a subsequent pilot phase of the MOOC, but it was also necessary to identify the most evident elements that need modification or interventions.

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