Narrating the museum to promote empathy and critical thinking in medical science students and doctors through online activities: A pilot research experience

Narrare il museo per promuovere l'empatia e il pensiero critico nei medici in ruolo e in formazione attraverso attività online. Un'esperienza pilota di ricerca

Antonella Poce[A]*, Massimo Mancone[B], Maria Rosaria Re[C], Mara Valente[C], Carlo De Medio[C], Francesca Amenduni[D], and Viviana Maestrini[B]

A) University of Modena and Reggio Emilia, Reggio Emilia, Italy, antonella.poce@unimore.it*
B) Sapienza University of Rome, Rome, Italy, massimo.mancone@uniroma1.it, viviana.maestrini@uniroma1.it
C) University Roma Tre, Rome, Italy, mariarosaria.re@uniroma3.it, mara.valente@uniroma3.it, carlo.demedio@uniroma3.it
D) Swiss Federal University for Vocational Education and Training, Lugano, Switzerland, francesca.amenduni@sfuvet.swiss

* corresponding author

HOW TO CITE Poce, A., Mancone, M., Re, M. R., Valente, M., De Medio, C., Amenduni, F., & Maestrini, V. (2021). Narrating the museum to promote empathy and critical thinking in medical science students and doctors through online activities: A pilot research experience. *Italian Journal of Educational Technology, 29*(3), 20-36. doi: 10.17471/2499-4324/1224

ABSTRACT The research experience "Narrating the museum to promote empathy and critical thinking in medical science students and doctors through online activities", carried out within the "Inclusive Memory" project, co-funded by University Roma Tre, aims at promoting empathy and critical thinking skills in medical science students and doctors through heritage education activities. The innovative features of the research experience lie in the use of online activities, combining different learning methodologies: Visual Thinking Strategies, Reflective Questioning, Storytelling and Object-Based Learning. The paper presents the results of the pilot activity carried out by the Centre for Museum Studies research group, based at the Department of Education – Roma Tre, in collaboration with the Sapienza University of Rome. It also describes the teaching activities, learning and evaluation tools used during the pilot experience, which involved 35 participants. The trial results highlight a statistically significant improvement in the Critical Thinking *use of language* indicators and an improvement of *Sensitivity to the context* empathy dimension; participants state that their levels of communication and critical

thinking skills improved at the end of the activities and that the exercises foreseen stimulated reflection, observation and interpretation.

KEYWORDS Medical Education; Critical Thinking; Empathy; E-learning; Heritage Education.

SOMMARIO L'esperienza di ricerca "Narrare il museo per promuovere l'empatia e il pensiero critico in studenti di medicina e dottori", realizzata nell'ambito del progetto "Inclusive Memory", co-finanziato dall'Università Roma Tre, mira a promuovere l'empatia e la capacità di pensiero critico nei medici, anche in formazione, attraverso attività di educazione al patrimonio. Le caratteristiche innovative dell'esperienza di ricerca risiedono nell'utilizzo di attività online, che combinano diverse metodologie di apprendimento: *Visual Thinking Strategies*, *Reflective Questioning*, *Storytelling* e *Object-based learning*. Il contributo presenta i risultati dell'attività pilota svolta dal gruppo di ricerca del Centro di Didattica Museale, con sede presso il Dipartimento di Scienze della Formazione dell'Università Roma Tre, in collaborazione con Sapienza Università di Roma. Vengono inoltre descritte le attività didattiche, gli strumenti di apprendimento e di valutazione utilizzati durante tale esperienza, che ha coinvolto 35 partecipanti. I risultati della sperimentazione descritta evidenziano un miglioramento statisticamente significativo per quanto riguarda l'indicatore di pensiero critico "uso della lingua" e un miglioramento della dimensione empatica della sensibilità al contesto; i partecipanti dichiarano che i loro livelli di comunicazione e pensiero critico migliorano alla fine delle attività e che gli esercizi progettati stimolano la riflessione, l'osservazione e l'interpretazione.

PAROLE CHIAVE Pedagogia Medica; Pensiero Critico; Empatia; E-Learning; Educazione al Patrimonio.

1. INTRODUCTION

In the Western clinical medicine practice, nowadays, the rationalist approach is dominant (Halpern, 2003), although empathetic and sympathetic dispositions have been considered fundamental for medical professions since Hippocrates' time. In the mainstream of medical and clinical approach, qualities like impersonality and neutrality are considered necessary to provide objective medical judgement and make rational decisions. Besides this, the widespread and biased belief that care professionals' empathy is associated with higher exposure to burnout (Brazeau, Schroeder, Rovi, & Boyd, 2010), further contributed to develop misconceptions toward the role of empathy in medical professions (Landau, 1993). Affective components are often neglected in favour of a cognitivist view of empathy defined as the ability to logically understand someone else's point of view (Ratka, 2018). The influence of the cognitivist approach on empathy is shown by the huge number of university courses in which empathy is taught as a mixture of cognitive abilities and behaviours (Winefield & Chur-Hansen, 2000).

In contrast with this, in recent years, a new field of research, named "medical humanities" (Zannini, 2008; Cole, Carlin, & Carson, 2014), is reconsidering the role of empathy in medical professions. Different research works show the positive impact of introducing humanistic elements, such as art and literature, in medical education.

Several studies have been carried out with the aim of establishing a connection between doctor and patient based on empathy and supporting medical science students and doctors in building new knowledge and awareness, starting from a critical reflection and through aesthetic experiences based on heritage education (Jacques, Stone, Tang, Hudson, & Khandelwal, 2012; Lieberman & Parker, 2019) and "arts-based learning", defined as the use of artistic tools and processes to foster learning in non-artistic domains (Catterall &

Deasy, 2002). In particular, in the field literature, the following learning methodologies have been considered as extremely effective in terms of empathy promotion:

- Object Based Learning (OBL): educational methodology that involves the use of museum objects as drivers of a heritage experience. This is possible thanks to manipulation, carried out thanks to technologically advanced tools based on 3D reproductions, works of art, sculptures and artefacts, used as stimulating activators of experiential learning, in a circular process that recalls Kolb's theory (1984) (Hubard, 2011; Duhs, 2019).
- Visual Thinking Strategies (VTS): in visual thinking activities, the educator encourages users to observe a museum object, make connections, interpret it, consider alternative readings and base their statements on what they see. Through VTS, "*knowledge is not received and absorbed passively, but created by the learner through an integrated process*" (Terrassa, Hubard, Holtrop, & Higgins-Linder, 2016, p. 8), promoting observation, interpretation and aesthetic thinking (Housen, 2001).
- Reflective questioning (RQ): starting from the reflective thinking theory promoted by Dewey (1910), RQ techniques support critical thinking skills through specific questions which allow students to analyse a problematic or unclear situation, argue about their ideas, critically evaluate them and produce new inferences (Gibbs, 1988).
- Storytelling (ST): the art of storytelling has been present in the history of mankind since its inception and it is actually the original form of teaching (Pedersen, 1995). ST pedagogy places communication at the centre of the educational process and helps students to understand the complexity of the experiences engaged building knowledge, thus supporting their internal motivation (Grever, De Bruijn, & Van Boxtel, 2012).

A recent review (Mukunda et al., 2019) describes how VTS improved different medical science students' skills: diagnostic skills, empathy, visual thinking skills, cultural communication, and sensitiveness. In their review, the authors describe how successful partnerships made up of local art museums and universities were started, allowing students to participate in activities like VTS.

Afghani and colleagues (Afghani, Besimanto, Amin, & Shapiro, 2011) described the positive impact of a four-year program on medical science students' empathic skills. The program included different kinds of reflective writing activities (e.g. writing a personal story of a relative with a disease, or a story written from the perspective of a patient) and the creation of artefacts starting from artistic objects, according to OBL methodology (Chatterjee & Hannan, 2016).

In a recent study by Bentwich and Gilbey (2017), the authors described the impact of VTS on medical first year students' ability to manage and tolerate the ambiguity and the possible mediating role of empathy. According to the authors, ambiguity tolerance, defined as "the ability to manage different interpretations of the same phenomenon", is an important skill for healthcare professions and it is considered a precursor of Critical Thinking (CT) in clinical decision-making. Indeed, in clinical decision-making, doctors need to deal with several plausible interpretations of the same phenomenon and, consequently, the different actions to take. However, medical science students often show difficulties in managing different interpretations. In response to this issue, Bentwich and Gilbey (2017) decided to adopt VTS because this pedagogical approach, thanks to the visualization and the discussion around artistic objects, support students in developing multiple interpretations of the objects' meaning. According to the authors, participants highlighted that their skills improved, in terms of ambiguity toleration and management of different interpretations of clinical cases. Students stated they experienced an improvement in their *Visual Thinking*, defined as a process of interpreting and understanding information through images (Ware, 2008, p. 10) and empathic skills. Other authors achieved similar conclusions (Zazulak et al., 2017). They found that a curriculum

which combines art-based activities with evidence-based observation and self-awareness promotion (e.g. through mindfulness techniques) can facilitate empathic reactions and communication, by also improving doctors' well-being.

Moreover, the idea that medical science students lack Critical Thinking, in terms of how they approach both medical knowledge and patients, was confirmed by the study of Zayapragassarazan and Chacko (2019), who highlighted a gap both in students' attitude toward CT and CT skills themselves.

If the above-mentioned educational strategies seem effective to support certain skills, it is worth enhancing them by the use of digital technologies. Concerning VTS, for example, it is worthwhile mentioning the case study of a Massive Open Online Course (MOOC) created by the National Gallery of Art in Washington DC, in which participants are invited to take part in different discussion forums aimed at creating new meanings of selected works of art and interpreting them through the support of literary extracts.

So far, the impact of these innovative projects on CT has been rarely assessed on a research basis (Poce et al., 2020b; Schoonover, 2021), especially in the context of medical humanities.

Starting from these considerations, the Centre for Museum Studies (CDM), based at the Department of Education of University Roma Tre, designed and implemented the pilot phase of the research experience "Narrating the museum to promote empathy and critical thinking in medical science students and doctors through online activities", within the "Inclusive Memory" project and with the collaboration of Sapienza University of Rome.

2. THE INCLUSIVE MEMORY PROJECT

The "Inclusive Memory" project, funded by the University of Roma Tre, fostered the creation of a shared memory through an inclusive system developed at the museum. The core of this project is a close connection between new teaching methodologies and the implementation of digital tools, in order to support transverse competencies in all museum users. Thanks to a strong cooperation among universities, research institutes and museum educational departments, the project aimed at creating educational paths to promote social inclusion and well-being, especially in participation terms, within museum users. As underlined by the Council of Europe, soliciting transverse competences within inclusive cultural contexts improves people well-being, which is related to being active, responsible, connected, resilient, appreciated, respected and aware (National Council for Curriculum and Assessment, 2017).

The experience described in this article is one of the many educational activities stemmed from the theoretical framework of the "Inclusive Memory" project (Poce, 2020). It takes into consideration three main aspects: the promotion of transverse competences (critical thinking in particular) through heritage within medical science students and doctors; the use of innovative e-learning paths for heritage education; the promotion of empathy, in relation with the construct of well-being (Bourgault et al., 2015), to improve professional and citizenship skills.

3. THE RESEARCH PROCESS: METHODOLOGY

3.1. Description of the educational context and research aims

The research experience herewith described was designed and implemented by CDM research group during the academic year 2020-2021 with the aim of promoting empathy and critical thinking of medical science students and doctors through online heritage education activities. The use of such online activities can be considered an innovative element in the present research: previous studies, in fact, have shown how heri-

tage education, combined with specific teaching methodologies (such as VST, Reflective Questioning, OBL and Storytelling), can promote empathy and critical thinking in medical science students and doctors but not in connection with distance learning tools. There are many experiences and case studies related to the promotion of critical thinking for students in the biomedical field, also exclusively online (Dominguez et al., 2018), but the connection between heritage education and online activities for the promotion of empathy and critical thinking skills in medical science students and doctors still needs to be deeply explored. Within this research experience, only methodologies previously adopted and validated in distance learning settings were adopted. The use of a fully online unit was determined by practical, as well as research, reasons: firstly, due to national restrictions for the containment of the pandemic, museums and heritage sites have been closed for a long time, thus preventing access even for study and research purposes to all categories of users; moreover, the implementation of activities entirely online makes the participation of doctors and medical science students "easier", allowing them to participate in their free time from work, internship and university classes.

The pilot phase of the experience involved 35 medical science students and doctors affiliated to Sapienza University of Rome, recruited on a voluntary basis. The 6-week learning unit was attended entirely online by the users participating in the pilot on the CDM Moodle platform. Two tutors, from the CDM research group, provided technical support during the e-learning path.

The present research experience is aimed at assessing the impact of a combination of art-based methods, such as visual thinking, on some skills considered fundamental for medical science students and doctors:

- Empathic skills, including empathic communication with patient and their relatives.
- Critical Thinking skills, specifically a) ambiguity tolerance b) considering multiple perspectives on the same phenomenon c) assessing evidence d) producing inferences based on the evidence e) making clinical decisions f) communicating effectively with colleagues and patients by providing correct argumentation of a taken stance.

3.2. *Course design methodology*

The online activities carried out within the path were designed and delivered taking into consideration the ODIP (Observe, Describe, Interpret, Prove) critical thinking strategy (Jacques, Stone, Tang, Hudson, & Khandelwal, 2012). The ODIP strategy was adapted to the online learning context and used during the learning experience.

O	**OBSERVE**	Take a few minutes to look hard and look closely. What do you see? Try to find a detail you think no one else will notice.
D	**DESCRIBE**	Describe what you're looking at, using adjectives and descriptive language. What colors are present? How would you describe these colors?
I	**INTERPRET**	What's going on in this work of art? Make an interpretation based upon what you see in the work.
P	**PROVE**	Prove your interpretation using visual evidence. What do you see that supports your interpretation?

Table 1. The ODIP strategy by Jacques, Stone, Tang, Hudson, & Khandelwal, 2012, p. 2.

The online activities combined literary stimuli and works of art, taking inspiration from two different already tested frameworks: "Promoting critical thinking through art", developed by Harvard University in

collaboration with the National Gallery of Art (NGA) Washington DC; and "Creative writing for critical thinking enhancement", developed by the CDM research group (Poce & Amenduni, 2019). In particular, the "Creative writing for critical thinking enhancement" framework was adopted with some further implementation, concerning the definition and development of the exercises. This method is organized in two phases (see Table 2). In the first phase, participants receive a literary text inspired by a work of art in a Virtual Learning Environment. Participants are then required to analyze the text and the work of art together, through ten questions with a growing and progressive difficulty. In the second phase, participants are asked to collaboratively write (through the support of digital applications, such as wikis or Google Doc) a creative narrative based on a selected work of art.

PHASES	EDUCATIONAL ACTIVITIES	LEARNING METHODOLOGIES USED	TYPE OF ACTIVITIES
No. 1	Analysis and interpretation activities of literary text combined with a work of art.	Visual Thinking Strategies Object-Based Learning Reflective Questioning	Online Individual activity
No. 2	Production of a creative narrative based on a selected work of art	Storytelling	Online Collaborative activity

Table 2. Synthesis of the "Creative writing for critical thinking enhancement" method.

Within the research experience "Narrating the museum to promote empathy and critical thinking in medical science students and doctors through online activities", both the ODIP strategy and the "Creative writing for critical thinking enhancement" methods are adapted and combined together, thus resulting into 5 different online activities (see Table 3) to be carried out through the CDM Moodle platform. To be noted that in this pilot all the activities were designed to be carried individually and this was due to a major practical reason: medical science students and doctors participating in the pilot were particularly busy professionally during the spread of the Covid-19 pandemic; thus, through individual activities, they were able to carry out the learning experience in their free time, with no other specific deadlines than the start and end of the course.

3.3. *Educational activities*

The activities were focused on the work of art "Where do we come from? What are we? Where are we going?" painted by Paul Gauguin in 1897[1]. Five literary texts by the following authors from the XIX and XX centuries were associated with the whole painting and with some of its sections: Baudelaire, Pascoli, Ungaretti, Bufalino.

Therefore, the online unit is composed of 5 learning activities, which have been designed taking into account the following sequence of phases:

1) The ODIP (Observe, Describe, Interpret, Prove) technique on the painting, to stimulate abilities in critical thinking and problem solving. The routine that the ODIP creates for each activity encourages participants to continuously reflect on the whole painting and its portions not only in relation to what effectively participants identify in the image, but even to the suggestions provided from the literary

[1] https://en.wikipedia.org/wiki/Where_Do_We_Come_From%3F_What_Are_We%3F_Where_Are_We_Going%3F#/media/File:Paul_Gauguin_-_D'ou_venons-nous.jpg (Museum of fine Arts, Boston).

text associated with the painting.

2) The inductive reasoning: starting from reflective questions on "technical-artistic" aspects (colours, figures, lines for the artwork and figures of speech and key words for the literary text) and ending with a general interpretation of the image, based on those aspects.
3) Analysis and interpretation from the combination of the work of art and the literary text.

The online unit starts with an overall view, analysis and interpretation of the painting as a whole, (activity No. 1), and then continues with the analysis of some of its portions (activities No. 2-3-4). At the end, participants go back to the overall view, analysis and interpretation of the work of art (activity No. 5). Therefore, the resulting circular model is characterized by equal phases of exercises but different topics, artistic and literary stimuli.

The resulting five online activities are structured as it follows (Table 3).

ACTIVITY NO.	WORK OF ART	LITERARY STIMULUS	MAIN THEMES OF REFLECTION	LEARNING METHODOLOGY USED
1	Overview of Gauguin, *Where Do We Come From? What Are We? Where Are We Going?*, 1867-1898, Museum of Fine Arts, Boston	Extract from the poem "Correspondences" (Baudelaire, 1857)	Nature	**Visual Thinking Strategies; Object-Based Learning; Reflective Questioning; Digital Storytelling.**
2	Detail 1 of Gauguin, *Where Do We Come From? What Are We? Where Are We Going?*	Extract from the poem "Germoglio" by Pascoli (1891)	Birth	
3	Detail 2 of Gauguin, *Where Do We Come From? What Are We? Where Are We Going?*	Extract from the poem "Tu ti spezzasti" (Ungaretti, 1969)	Youth	
4	Detail 3 of Gauguin, *Where Do We Come From? What Are We? Where Are We Going?*	Extract from Bufalino's novel "Diceria dell'untore" (1981)	Death	
5	Overview of Gauguin, *Where Do We Come From? What Are We? Where Are We Going?*, 1867-1898, Museum of Fine Arts, Boston	Extract from the poem "Veglia" (Ungaretti, 1916)	Life	

Table 3. Overview of the e-learning unit proposed in the pilot phase.

3.3.1. *Choice of artistic and literary stimuli*

Thanks to the symbolic and figurative narrative of its subject, the choice of the work of art "*Where Do We Come From? What Are We? Where Are We Going?"* was essential for the purposes of the research experience. The majestic work of art, which measures more than 3 mt in length and almost 1 mt and 40 cm in height, represents the ages of life using various symbols of Christian and Buddhist culture and twelve human figures, animals and plants. Understanding the artwork general sense and its figurative narrative is not easy for those who are not art experts or those who are not familiar with the painting and its meaning. Even nowadays, art critiques debate over the interpretation of the complex symbolism made by Gauguin, who was one of the most important representatives of the Symbolism movement.

At a first glance, the work seems to represent a typical Polynesian setting, a verdant Eden with a suspended

atmosphere, populated by natives. However, looking closely at the figures, it becomes clear that the aim of the painter is different: actually, through the disposition of the human figures, the contrasting use of warm and cold tones, the combination of the different elements, Gauguin describes the stages of human life from birth to death.

Since the artwork is very difficult to interpret, the observer can critically investigate the deeper meaning of the represented elements and reflect on human existence only through specific stimuli.

The exercises created for the research experience included the combination of images with literary texts, in order to solicit a deeper critical reflection and support the empathic relationship between the participant and the themes of the painting.

The literary texts were selected by taking into consideration the following elements:

- inherent theme of the image (nature, birth, youth, death, life);
- use of literary symbolism.

The literary texts, both poetic and prose, were presented to the participants together with the painting/sections of the painting (see Table 3) and they were linked to some details of the work of art in order to support the solicitation of critical reflection and empathy. In particular, the participant was required to describe the literary text in relation with the image of the painting, identifying possible analogies and differences or common symbols, and to review the text, defining personal judgments about lexical choices or writing metaphors.

The choices made in relation to the artistic and literary stimuli are furthermore functional to the selected target of medical science students and doctors: the use of a specific colour, the figures represented and their actions, the symbolic language of the literary texts are all stimuli that aim to encourage (future) doctors' ability to observe analytically, to conceptualize, to make logical deductions and inferences from different data, and to stimulate problem solving. The attention to the artistic and literary details represents a further incentive to identify oneself with the mindset of the main figures of the painting, in order to deeply connect gestures, postures and emotions. In summary, the artwork, the literary texts and the exercises trigger the participant to establish a "relationship" with the stimuli, aimed at making a personal interpretation of the aesthetic experience. This relationship is the same "professional and empathic" one that doctors themselves are called to establish when dealing with patients.

3.4. *Data collection tools*

During the pilot phase of the experience, we adopted a quasi-experimental design, with a pre-post data collection and only one experimental group considered. The pilot experience was evaluated through the use of 3 different data collection tools:

1) pre- post questionnaire of empathy adapted from the Basic Empathy Scale in Adults (BES-A) and Emotional Style Questionnaire (ESQ) tools.
    a. The Basic Empathy Scale BES-A (Carré, Stefaniak, D'ambrosio, Bensalah, & Besche-Richard, 2013) is a 20-item self-report scale in which participants give their ratings on a 5-point Likert scale. 9 items assess cognitive empathy and 11 items assessed affective empathy.
    b. The Emotional Style Questionnaire (Kesebir, Gasiorowska, Goldman, Hirshberg, & Davidson., 2019) is a 24-item self-report measure that captures how people vary across 6 dimensions: Outlook, Resilience, Social Intuition, Self-awareness, Sensitivity to context and Attention. Each dimension is assessed through 4 items.
2) Pre- and post-test on critical thinking skills: short-essay methodology assessed by using a rubric developed and validated in previous studies (Poce, 2017; Poce, Amenduni, Re, De Medio & Norgini, 2020).

3) A final questionnaire on transverse skills self-assessment and overall evaluation of the experience, adapted from the tool by Poce and colleagues who was developed and implemented within online educational activities (2015).

The two pre-post assessment activities of empathy and critical thinking were carried out online by the participants of the pilot phase respectively before the unit start and at the end of all the learning activities. The self-assessment questionnaire on the experience was filled in by participants one week after the end of the learning activities.

BES-A and ESQ tools (1) were provided in Italian and not in the original language of implementation and validation (English). The translation into Italian was carried out by translators with expertise in scientific and pedagogical English. Internal reliability was assessed through Cronbach Alpha to collect preliminary evidence of the psychometric properties of the Italian version of the questionnaire. Basic statistical analyses were carried out on the data, which were collected anonymously.

Critical Thinking was assessed (2) taking into consideration six indicators: use of language, argumentation, relevance, importance, critical evaluation, and novelty. Participants were scored from 1 to 5 to each category. In particular, participants were asked to read an extract of the *Dialogue concerning two chief world systems* (Galilei, 1632) and write an essay according to six different guiding questions. The analysis included 35 medical science students and doctors' pre- and post-tests: thus, the entire text *corpus* taken into consideration was composed of 70 essays. All the essays were assessed by human evaluators and through an algorithm which calculates different kinds of Natural Language Processing features simultaneously (Poce, Amenduni, Re, De Medio & Norgini, 2020a). Two experts independently assessed each essay and the average between experts was calculated.

As regards the other data collection tool, it was composed of 20 questions and three main sections:

1) Socio-anagraphic section (11 questions);
2) Overall evaluation of the online activities (6 questions);
3) Self-assessment of the transverse skills promoted during the pilot experience (3 questions).

The tool included open-ended questions, closed questions and Likert scales, and aimed at investigating several indicators, that are summarized in the following table (Table 4). Basic statistical analyses were carried out on the data, which were collected anonymously. The data collected through open-ended questions were analysed using content analysis tools.

SECTION	QUESTION NO.	INDICATORS	QUESTION TYPE
Socio-anagraphic section	1	Sex	Closed question
	2	Year of birth	Open question
	3	Year of first enrollment in the university system	Open question
	4	Year of enrolment in the University Course Degree attended	Open question
	5	Medical specialty	Open question
	6	Medical subspecialty	Open question
	7	Completion of study time (year)	Open question
	8	Role	Closed question
	9	Place of work	Closed question
	10	Type of secondary school	Closed question
	11	Personal interests (sport, music, theatre, cinema, books)	Likert Scale (1 to 4)
Overall evaluation of the e-learning activities	12	Evaluation of e-learning activities	Likert Scale (1 to 4)
	13	Evaluation of the content quality	Likert Scale (1 to 4)
	14	Strengths	Open question
	15	Weaknesses	Open question
	16	Favourite image of the selected work of art (whole or sections)	Closed question
	17	Favourite literary text	Closed question
Self-evaluation of the transverse skills promoted	18	Transverse competences solicited	Likert Scale (1 to 4)
	19	Three most solicited skills	Open question
	20	Explanation of the previous choice	Open question

Table 4. Overview of structure of the tool "Self-evaluation of the transverse skills promoted and on the evaluation of the experience".

4. RESULTS

4.1. *Participants' evaluation of the pilot phase*

As already mentioned, in total, 35 medical students and doctors (M= 13; F= 22) participated in the learning experience. Only one participant is more than 50 years old: 21 participants out of 35 are from 30 to 40 years old and 12 participants are under 30 years old. Most participants enrolled at university for the first time from 10 to 20 years ago (23 out of 35). 23 participants have a specialization in cardiology and 4 in cardiovascular

diseases or infectious diseases. 9 participants also have a sub-specialization in clinical cardiology and 7 in haemodynamics; other sub-specializations are less represented (cardiac electrophysiology = 3; imaging=4). The group of participants is mainly composed of in-training doctors (18 out of 35); 14 participants have already acquired a medical specialization and 2 participants are researchers in medical field. Participants' favorite leisure activities are sports and music, followed by cinema, reading and theatre.
Concerning e-learning activities, most of the participants rather agree or very much agree with the statement that this learning experience will support them to carry out their work (N=21) and study tasks (N=23) better; e-tutors' support was defined as quite or very good by 21 participants out of 35. The course evaluation indicators that received the highest ratings are clarity of the language used, clarity of the activities offered and clarity of the content (by 16 and 14 participants respectively, Figure1).

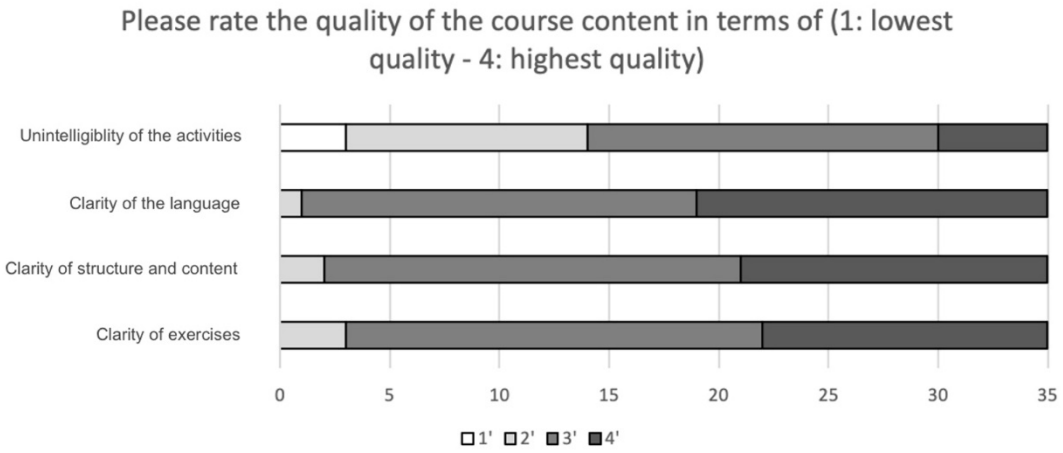

Figure 1. Evaluation of the content quality of the e-learning course.

Content analysis of the open-ended answers given by the participants shows that the promotion of critical and visual thinking skills is considered among the strengths of the online activities carried out. This underlines the effectiveness of the ODIP routine in terms of self-assessment of the skills promoted: observation (6 occurrences), analysis (3 occurrences) and personal reflection (6 occurrences) are perceived by participants as extremely important within the online learning unit. The combination of works of art and literary texts is defined as interesting by 9 participants out of 35. The promotion of creativity (3 occurrences), communication (3 occurrences) and empathy (2 occurrences) is also emphasised by the participants, who particularly appreciated the opportunity to reflect on their emotions, to analyse them in relation to literary and artistic prompts and to communicate their feelings. One participant stated: "*The course stimulated observation and critical reading, a more intimate and careful search for one's own emotions related to a work of art or a literary composition, the overcoming of the sterility of just looking, that everyday life often forces us to"*.
Concerning the weaknesses of the course, 9 participants underline the presence of similar types of exercises, probably linked to the ODIP routine, and the limited time (5 participants) available to carry out the activities. The use of only one work of art was also evaluated by 2 participants as a negative element of the unit, which should be enriched with a wider selection of different paintings. The presence of literary extracts proved difficult for 2 participants, in terms of comprehension and interpretation. 5 participants decided not to report any weaknesses. Participants' favourite image during the activities is the whole picture (28 out of 35), while the two favourite literary prompts are "Correspondences" by Baudelaire (12) and "Veglia" by

Ungaretti (10). Correlation between preferences is not statistically significant.
As regards self-assessment of the skills stimulated during the activities, at the end of the experience, participants stated to be rather or very skilled in terms of critical thinking (33), communication (31), interpersonal skills (31), evaluation and problem solving (30). Analyses of the data obtained report a promising positive correlation between interpersonal skills and mediation skills (r=0.71).

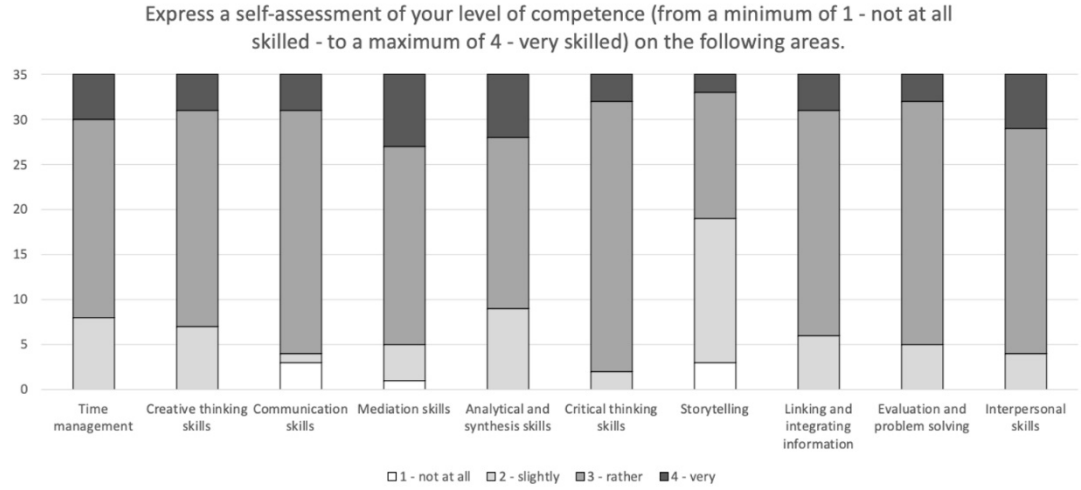

Figure 2. Transverse competences solicited at the end of the experience.

4.2. *Participants' Critical Thinking level*

As already mentioned, the initial corpus of pre and post essays as regards critical thinking assessment activity is composed of 70 essays (35 from the pre-test and 35 from the post-test). Incomplete essays or essays written after the start of the online activities were eliminated from the *corpus*. Therefore, the analyses were carried out on a total number of 58 essays of users who completed the pre-test (No. 29) and post-test (No. 29), respectively at the beginning and at the end of the pilot activities. The averages of the assessments carried out in the double-blind mode by two evaluators were analyzed by means of basic statistical analyses in order to verify the level of solicitation of the following critical thinking indicators: use of language, argumentation, relevance, importance, critical evaluation, and novelty.
Analyses show that the average score obtained by participants' changes from 18,77 points in the pre-test to 19,33 points in the post-test (pre-test ds =6,19; post-test ds =5,37). The average scores increase in 4 out of 6 indicators from the pre-test to the post-test: *use of language*, *argumentation*, *importance* and *critical evaluation*. The Wilcoxon rank-sum test was adopted in order to see whether differences between pre-test and post-test were statistically significant: the test shows a significant difference with $p < 0,01$ for the macro-indicator *use of the language* (pre M 3,89 ds=0,67; post M 4,36 ds=0,51; p=0,009). There were not any significant differences for *argumentation* (pre M 3,04 ds=1,20; post M 3,09 ds=1,14; p=0,869), *importance* (pre M 3,09 ds=1,17; post M 3,36 ds=0,95; p=0,474) and *critical evaluation* (pre M 2,89 ds=1,24; post M 3,00 ds=0,97; p=0,782) indicators.

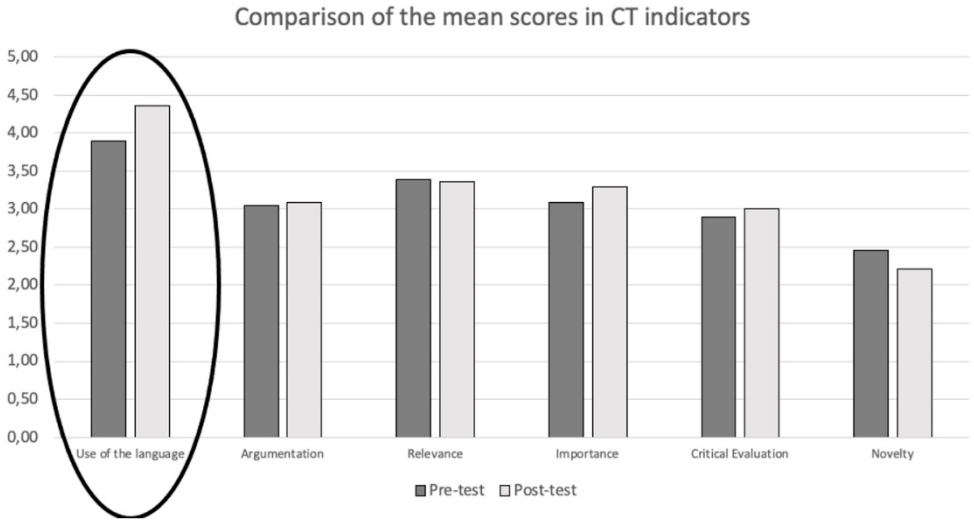

Figure 3. Mean score comparison chart of CT indicators in pre-test and post-test activities.

4.3. *Participants' Empathy level*

Doctors who participated in the pilot phase showed a modest change in empathy.

Specifically, 5 out of 6 dimensions of the ESQ tools increased the minimum score from pre-test to post-test, from 1 to 2. The sum and average of the scores obtained from four dimensions increased in the post-test, together with a decrease in the standard deviation: in particular, average score slightly increased in *Social Intuition* (pre-test: 5.07, ds= 1.78; post-test: 5.29, ds= 1.67 points) and increased more considerably in *Self-awareness* (pre-test: 4.77, ds=1.68; post-test: 5.29, ds= 1.65 points), *Resilience* (pre-test: 4.04, ds= 1.61; post-test: 4.53, ds= 1.42 points) and *Sensitivity* (pre-test: 4.32, ds= 2.00; post-test: 5.79, ds= 1.45 points) dimensions.

As regards *Social Intuition* and *Sensitivity*, kurtosis index changes occurred from pre-test to post-test, switching from negative to positive and defining a different distribution of scores (from -0.76 to 0.71 in the *Social Intuition* dimension; from -1.37 to 0.65 in the *Sensitivity to context* dimension). Also in this case, the Wilcoxon rank-sum test was adopted in order to see whether differences between pre-test and post-test were statistically significant. From the data collected, only in the *Sensitivity to context* dimension the increase of scores from pre-test to post-test is statistically significant (p=0.0001), while for the other indicators the change is not statistically significant. (*Social Intuition* p=0.743; *Outlook* p=0,09; *Resilience* p=0,137; *Self-awareness* p=0,228; *Attention* p=0,296).

	PRE-TEST SENSITIVITY TO CONTEXT	POST-TEST SENSITIVITY TO CONTEXT
Minimum	1.00	2.00
Maximum	7.00	7.00
Mean	4.53	5.79
Median	5.00	6.00
Mode	7.00	7.00
Standards Deviation	2.03	1.43
Kurtosis	-1.37	0.65

Table 5. Basic statistical analyses carried out on the scores of the "Sensitivity to context" dimension of empathy (ESQ) in pre and post-test activities.

Regarding the BES-A tool, the data collected on doctors participating in the pilot phase are discrepant. While Cognitive Empathy scores increased not significantly from pre-test to post-test (pre-test: 5,86, ds= 1,39; post-test: 5.93, ds= 1,07 points), the same is not true for Affective Empathy scores, whose mean scores range from 4,71 points (ds=1,86) in the pre-test to 4,59 (ds=1,74) in the post-test. Changes in empathy scores collected through the BES-A tool and analyzed through the Wilcoxon rank-sum test are not statistically significant.

As stated earlier, the empathy assessment tools were provided to participants in Italian rather than the original English language version. Cronbach's Alpha test was carried out on the data acquired during the pilot experience in order to verify the reliability of the survey instrument translated into Italian. For the BES-A tool, α value is not so good (α=0,345), while for the ESQ tool, data show a positive result (α=0,710).

5. DISCUSSION AND CONCLUSIONS

The use of artistic and cultural heritage and of active teaching methodologies (such as OBL, VST, Storytelling, and Reflective Questioning) for soliciting empathic attitudes and critical skills in medical science students and doctors is supported by research in Medical Humanities, an interdisciplinary field that connects medical sciences with humanities (literature, history, philosophy, and religion) and the arts (visual arts, literature, cinema, theatre). This addition to the medical training curricula was deemed necessary to address the doctors' shortcomings regarding empathy towards their patients, their observational and analytical abilities (medical history and diagnosis), and to strengthen their communication skills with their patients and work team.

The pilot experience presented here is characterized by the design, implementation, and evaluation of an online course addressed to medical science students and doctors aimed at promoting empathy and critical thinking skills through online activities heritage fruition, analysis and interpretation.

The results of the pilot experience show a statistically significant improvement in the *use of language* Critical Thinking indicator and an improvement of *Sensitivity to the context* empathy dimension within participants in the activity. Moreover, participants stated that critical thinking and communication were the transverse skills mostly stimulated at the end of the unit and that the prompts to observation, analysis and interpretation of works of art and literary stimuli were the strengths of the online activities proposed in terms of critical reflection and empathy.

However, there is still extensive room for improvement. First of all, the limited number of participants does not allow generalizations of the results. The research methodology used (quasi-experiment) could be changed in subsequent research in order to identify the relationship with other variables not considered in this pilot. In addition, the participation of a larger number of participants and a diversified target of medical science students and doctors (different years of study and different type of specialization) could provide additional data on the effectiveness of the online learning unit described in the present paper. With a larger sample, it would be possible to test the validity of the Italian translation of the tool employed for the empathy assessment, which was used for convenience of the users' mother tongue, being aware that the translation could limit the validity of the tool itself.

Moreover, in a follow up study, the introduction of different activities within the online learning unit, such as collaborative writing activities, and the extension of the time of the learning experience, could provide further insights and reflection in relation to the levels of development of empathy and critical thinking skills within participants. Finally, additional tools to assess the level of empathy and critical thinking skills, such us the tool for CT automatic assessment, can be used during the activities in order to monitor and evaluate the effectiveness of the online experience at a deeper level.

6. AUTHORS' CONTRIBUTION

Antonella Poce coordinated the research presented in this paper. Research group is composed by the authors of the contribution that was edited in the following order: Antonella Poce (1, 2 and 5), Massimo Mancone and Viviana Maestrini (4.1), Maria Rosaria Re (3.1, 3.3 and 4.2), Mara Valente (3.2 and 3.3.1), Carlo De Medio (3.4), Francesca Amenduni (4.3).

7. REFERENCES

Afghani, B., Besimanto, S., Amin, A., & Shapiro, J. (2011). Medical students' perspectives on clinical empathy training. *Education for Health*, *24*(1), 1-6.

Baudelaire, C. (1857). *Les fleurs du mal*. Paris, FR: Poulet-Malassis & De Broise.

Bentwich, M. E., & Gilbey, P. (2017). More than visual literacy: art and the enhancement of tolerance for ambiguity and empathy. *BMC Medical Education, 17*(200). doi: 10.1186/s12909-017-1088-8

Bourgault, P., Lavoie, S., Paul-Savoie, E., Grégoire, M., Michaud, C., Gosselin, E., & Johnston, C. (2015). Relationship between empathy and well-being among emergency nurses. *Journal of Emergency Nursing*, *41*(4), 323-328, doi:10.1016/j.jen.2014.10.001

Brazeau, C. M., Schroeder, R., Rovi, S., & Boyd, L. (2010). Relationships between medical student burnout, empathy, and professionalism climate. *Academic Medicine, 85*(10), 33-36.

Bufalino, G. (1981). *Diceria dell'untore*. Palermo, IT: Sellerio.

Carré, A., Stefaniak, N., D'ambrosio, F., Bensalah, L., & Besche-Richard, C. (2013). The basic empathy scale in adults (BES-A): Factor structure of a revised form. *Psychological Assessment*, *25*(3), 679-691. doi:10.1037/a0032297

Catterall, J. S., & Deasy, R. (Eds.). (2002). *Critical links: Learning in the arts and student academic and social development.* Washington, DC, US: National Endowment for the Arts.

Chatterjee, H. J., & Hannan, L. (2016). *Engaging the senses: object-based learning in higher education*. New York, NY, US: Routledge.

Cole, T. R., Carlin, N. S., & Carson, R. A. (2014). *Medical humanities: an introduction*. Cambridge, UK: Cambridge University Press.

Dewey, J. (1910). *How we think*. Boston, MA, US: DC Heath and Company.

Dominguez, C. (Ed.). (2018). *A European review on critical thinking educational practices in higher education institutions*. Vila Real, SP: UTAD.

Duhs, R. (2019). "Hands on" learning from museums and collections in higher education. In A. Poce (Ed.), *Studi Avanzati di Educazione Museale. Lezioni. Advanced Studies in Museum Education. Lectures*. Napoli, IT: ESI.

Gibbs, G. (1988). *Learning by doing: a guide to teaching and learning methods*. Oxford, UK: Further Education Unit.

Grever, M., De Bruijn, P., & Van Boxtel, C. (2012). Negotiating historical distance: Or, how to deal with the past as a foreign country in heritage education. *Paedagogica Historica*, *48*, 873-887.

Halpern, J. (2003). What is clinical empathy? *Journal of General Internal Medicine*, *18*(8), 670-674.

Hakkarainen, K. A. I. (2003). Emergence of progressive-inquiry culture in computer-supported collaborative learning. *Learning Environments Research*, 6(2), 199-220.

Housen, A.C. (2001). Æsthetic thought, critical thinking and transfer. *Arts and Learning Research*, *18*(1), 99-132.

Hubard, O. (2011). Rethinking Critical Thinking and Its Role in Art Museum Education. *The Journal of Aesthetic Education*, *45*(3), 15-21.

Jacques, A., Stone, L., Tang, R., Hudson, W. A, & Khandelwal, S. (2012). Art of Analysis: A cooperative program between a museum and medicine. *Journal for Learning through the Arts, 8*(1), 1-10.

Kesebir, P., Gasiorowska, A., Goldman, R., Hirshberg, M. J., & Davidson, R. J. (2019). Emotional Style Questionnaire: A multidimensional measure of healthy emotionality. *Psychological Assessment, 31*(10), 1234–1246. doi:10.1037/pas0000745

Kolb, D.A. (1984). Experimental learning: experiences as the source of learning and development. Englewood Cliffs, N.J., US: Prentice-Hall, Inc.

Landau, R. L. (1993). And the least of these is empathy. In H.M. Spiro, E. Peschel, M. G. McCrea Curnen, & D. St. James (Eds.), *Empathy and the practice of medicine: Beyond pills and the scalpel* (pp. 103–109). New Haven, NY, US: Yale University Press.

Lieberman, I. D., & Parker, M. E. (2019). Turning theory into practice: A case study in the arts. *Journal for Learning through the Arts, 15*(1). doi:10.21977/D915142042

Mukunda, N., Moghbeli, N., Rizzo, A., Niepold, S., Bassett, B., & DeLisser, H. M. (2019). Visual art instruction in medical education: a narrative review. *Medical Education Online, 24*(1), 1558657. doi:10.1080/10872981.2018.1558657

National Council for Curriculum and Assessment (2017). *Guidelines for Wellbeing in Junior Cycle*. Retrieved from https://ncca.ie/media/2487/wellbeingguidelines_forjunior_cycle.pdf

Pascoli, G. (1891). *Myricae*. Livorno, IT: Raffaello Giusti Editore.

Pedersen, E. M. (1995). Storytelling and the art of teaching. *English Teaching Forum*, *33*(1), 2-5.

Poce, A. (2017). *Verba sequentur. Pensiero e scrittura per uno sviluppo critico delle competenze nella scuola secondaria*. Milano, IT: Franco Angeli.

Poce, A. (Ed.) (2020). *Memoria, inclusione e fruizione del patrimonio culturale. Primi risultati del progetto inclusive memory dell'Università Roma Tre.* Napoli, IT: ESI.

Poce, A., Agrusti, F., & Re, M.R. (2015). Sviluppo di uno strumento di valutazione delle risorse aperte (OERs). *Cadmo, Giornale Italiano di Pedagogia Sperimentale, 2*(23), 81-98. doi: 10.3280/CAD2015-002008

Poce, A. & Amenduni, F. (2019). Creative writing and critical thinking enhancement at higher education. In *Proceedings of the HEAD'19 5th International Conference on Higher Education Advances*, Valencia, Spain,26–58 June 2019 (pp. 459–467). doi: 10.4995/HEAd19.2019.9221

Poce, A., Amenduni, F., Re, M.R., De Medio, C., & Norgini, A. (2020a). Correlations among natural language processing indicators and critical thinking sub-dimensions in HiEd students. *Form@re - Open Journal Per La Formazione in Rete*, *20*(3), 43-67. doi:10.13128/form-9902

Poce, A., Caccamo, A., Amenduni, F., Re, M.R., De Medio, C., & Valente, M. (2020b). A Virtual Reality Etruscan Museum Exhibition–Preliminary Results of the Participants' Experience. In EDEN Conference Proceedings (Vol. 1, pp. 40-49). Retrieved from https://www.eden-online.org/proc-2485/index.php/PROC/article/download/1757/1465

Ratka A. (2018). Empathy and the development of affective skills. *American Journal of Pharmaceutical Education*, *82*(10), 1140-1143. doi: 10.5688/ajpe7192

Schoonover, N. R. (2021). Exploring visual literacy skills and dispositions through a museum-sponsored online professional development for K-12 teachers. *Journal of Visual Literacy*, 1-19.

Terrassa, J., Hubard, O., Holtrop, E., & Higgins-Linder, M., (2016). *Impact of art museum programs on students: Literature review*. Alexandria, VA, US: National Art Education Association.

Ungaretti, G. (1969). *Il dolore*. Milano, IT: Mondadori.

Ungaretti, G. (1916). *Il porto sepolto*. Udine, IT: Stabilimento Tipografico Friulano.

Ware, C. (2008). *Visual Thinking for Design*. Amsterdam, NL: Elsevier.

Winefield, H. R., & Chur-Hansen, A. (2000). Evaluating the outcome of communication skill teaching for entry-level medical students: Does knowledge of empathy increase? *Medical Education, 34*(1), 90–94.

Zannini, L. (2008). *Medical humanities e medicina narrativa: nuove prospettive nella formazione dei professionisti della cura*. Milano, IT: Cortina.

Zayapragassarazan, Z., & Chacko, T. V. (2019). A gap analysis of critical thinking skills and attitude toward critical thinking among interns. *International Journal of Health & Allied Sciences, 8*(3), 193-196. doi: 10.4103/ijhas.IJHAS_22_19

Zazulak, J., Sanaee, M., Frolic, A., Knibb, N., Tesluk, E., Hughes, E., & Grierson, L. E. (2017). The art of medicine: arts-based training in observation and mindfulness for fostering the empathic response in medical residents. *Medical Humanities, 43*(3), 192-198. doi: 10.1136/medhum-2016-011180