

24
December 2021

- Gaetano Domenici*
Editoriale / Editorial
Apprendimento scolastico, «denutrizione scientifica»
e atteggiamenti no-vax 11
(*School Learning, «Scientific Malnutrition» and No-vax Attitudes*)

STUDI E CONTRIBUTI DI RICERCA
STUDIES AND RESEARCH CONTRIBUTIONS

- Antonio Calvani - Paola Damiani - Luciana Ventriglia*
Evidenze, miti e prassi didattiche: il caso dell'insegnamento
della lettura nella scuola italiana 27
(*Evidence, Myths and Teaching Practices: The Case of Teaching Reading
in Italian Schools*)
- Andrea Ciani - Elia Pasolini - Ira Vannini*
Il *formative assessment* nelle convinzioni e nelle pratiche
degli insegnanti. Analisi secondarie da una indagine sui docenti
di scuola media di due regioni italiane 45
(*Formative Assessment in Teachers' Beliefs and Practices. Secondary Analysis
of a Survey on Middle School Teachers from Two Italian Regions*)

- Antonella Poce*
Virtual Museum Experience for Critical Thinking Development: 67
First Results from the National Gallery of Art (MOOC, US)
(Esperienza museale virtuale per lo sviluppo del pensiero critico: primi risultati della National Gallery of Art – MOOC, US)
- Choi Hyo-Jung - Lee Kyung-Hwa*
The Mediating Effect of Creative Personality in the Relationship 85
between Childcare Teacher's Efficacy and Creative Teaching
Behaviour
(L'effetto di mediazione della personalità creativa nella relazione tra l'efficacia degli insegnanti di scuola dell'infanzia e il comportamento didattico creativo)
- Kathryn Rai - Rajinder Singh*
Conflicts in Schools: Causative Factors and Resolution Strategies 109
(Conflitti nelle scuole: fattori causali e strategie di risoluzione)
- Italo Testa - Giovanni Costanzo - Alessio Parlati - Francesca Tricò*
Validazione di uno strumento per valutare la partecipazione 129
alle attività extracurricolari in area STEM. Il questionario
Science Activities Evaluation Engagement (SAEE)
(Design and Development of an Instrument to Measure Students' Engagement in Extra-curricular STEM Activities. The Science Activities Evaluation Engagement – SAEE)
- Paola Ricchiardi - Cristina Coggi*
L'affidamento familiare: le strategie educative elaborate 147
dagli affidatari
(Family Foster Care: Educational Strategies Developed by Caregivers)
- Amalia Lavinia Rizzo - Marta Pellegrini*
L'efficacia della musica a scuola: una rassegna delle evidenze 173
(Music Effectiveness in School: A Review of the Evidence)

Stefano Scippo - Émiliane Rubat du Mérac
Criterion Validation of the Scales of Autonomy, Collaboration,
Empathy, Problem-solving and Self-confidence of the 3SQ. Soft Skills
Self-evaluation Questionnaire Adapted for Lower
Secondary School 193
*(Convalida per criterio delle scale di Autonomia, Collaborazione,
Empatia, Problems-solving e Fiducia in sé del 3SQ. Soft Skills
Self-evaluation Questionnaire adattato per la scuola secondaria
di primo grado)*

NOTE DI RICERCA

RESEARCH NOTES

Irene Dora Maria Scierri
Strategie e strumenti di valutazione formativa per promuovere
l'apprendimento autoregolato: una rassegna ragionata
delle ricerche empiriche 213
*(Formative Assessment Strategies and Tools to Promote Self-regulated
Learning: A Reasoned Review of Empirical Studies)*

COMMENTI, RIFLESSIONI,

PRESENTAZIONI,

RESOCONTI, DIBATTITI, INTERVISTE

COMMENTS, REFLECTIONS,

PRESENTATIONS,

REPORTS, DEBATES, INTERVIEWS

Gaetano Domenici - Giuseppe Spadafora - Valeria Biasci
Presentazione dei Seminari Internazionali Itineranti 231
(Presentation of Itinerant International Seminars)

Journal of Educational, Cultural and Psychological Studies 237
Notiziario / News

Author Guidelines 241

Virtual Museum Experience for Critical Thinking Development: First Results from the National Gallery of Art (MOOC, US)

Antonella Poce

*Università di Modena e Reggio Emilia - Department of Education and Humanities
(Italy)*

DOI: <https://dx.doi.org/10.7358/ecps-2021-024-poce>

antonella.poce@unimore.it

ESPERIENZA MUSEALE VIRTUALE PER LO SVILUPPO
DEL PENSIERO CRITICO: PRIMI RISULTATI
DELLA NATIONAL GALLERY OF ART (MOOC, US)

ABSTRACT

In recent years, the use of innovative learning strategies within museum education contexts has been considerably supported by the use of digital technologies, especially in terms of critical thinking enhancement. As underlined by several studies in the field, the aesthetic experience is particularly effective in terms of reflection skills promotion, critical interpretation and analysis, both at individual and group level, as well as personal and creative reinterpretation (Biasi, Patrizi, & Fagioli, 2020). The present paper describes a research conducted within the MOOC «Teaching Critical Thinking through Art», created by the National Gallery of Art in Washington (DC), under the scientific supervision of the Harvard Project Zero researchers, pioneers of Visual Thinking Strategies within the museum context. The paper is aimed at illustrating the results of a content analysis conducted on the forum section of the above-mentioned MOOC during the 2020 edition. In particular, 163 posts from the «See/think/wonder» activity were assessed by two human evaluators using two different Critical Thinking evaluation tools (Garrison, Anderson, & Archer, 2001; Poce, 2017). In addition, specific analyses were carried out selected users' writing activities in order to identify possible positive correlations between the characteristics of forum posts and the critical thinking skills solicited.

Keywords: Aesthetic experience; Critical thinking; Digital learning; MOOC; Museum education.

1. INTRODUCTION

International political decision-makers identify critical thinking as a key element for the growth of social progress and knowledge in whichever field they operate. Even during the recent global health emergency, critical thinking has been defined in several occasions as an essential skill to promote greater social cohesion, conscious economic growth, and critical adaptation to new living conditions: the World Economic Forum (2021, p. 12), for example, emphasizes how critical thinking skills, along with creativity and self-management skills, make people more versatile, resilient and adaptable. Furthermore, Unesco considers critical thinking one of the fundamental 21st century skills (Scott, 2015). Critical thinking is also considered a pivotal skill in contexts of high technical and digital development: it is important to remember that the digital competence defined in DigiComp 2.1 (Carretero Gomez, Vuorikari, & Punie, 2017) qualifies researching, evaluating and managing digital content in a critical way as one of the 5 founding dimensions («Information and data literacy») and that even in work based contexts, where automation is increasingly developed, such as manufactory, the demand for workers endowed with critical thinking and programming skills is replacing the need for the low-skilled ones (Deloitte, 2018).

Said that, critical thinking is still a controversial concept, which is associated with several definitions borrowed from other fields, such as philosophy, educational and cognitive sciences (Moore, 2013; Johnson & Hamby, 2015). In the philosophical field especially, traditional interpretations describe critical thinking as an individual process that develops during reasoning activity. According to the definition produced in the Delphi Report (Facione, 1990), critical thinking is defined as «purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanations of the considerations on which that judgment is based». As stated by Kuhn (2019), critical thinking is a dialogical practice in which participants initially engage in an interactive way and then internalize concepts implicitly in their relationship with the other. Consequently, communication skills are important precursors for the development of critical thinking.

Taking into consideration these assumptions, a growing number of research articles have been published with the aim of investigating pedagogical practices that can support Critical Thinking development,

especially within innovative education context. Museum and art heritage education has also developed several experiences in the field, starting from the idea that the aesthetic experience, real or virtual, is defined as an important stimulus for the promotion of users' transversal skills, especially critical thinking (Poce *et al.*, 2020; Re, 2020). In particular, art-experience seems to be particularly effective in the development of observation and interpretation skills, especially in active and collaborative learning context (Terrassa, Hubard, Holtrop, & Higgins-Linder, 2016, p. 23) where participants have the opportunity to create connections with past knowledge and experience. The use of specific art-training approaches, such as routines, organize observation and interpretation during the art experience, thus providing a mental and operational structure for interaction with the art object useful in terms of critical thinking promotion (Ritchhart, 2007).

In the present study, an online and open educational experience is described and evaluated in terms of critical thinking enhancement. The results presented are intended to illustrate examples of protocols for assessing critical thinking through online writing activities and to provide useful insights about soliciting this skill through aesthetic experience in digital learning contexts.

2. PROMOTING CRITICAL THINKING THROUGH AESTHETIC EXPERIENCE

As underlined by several studies in the field, aesthetic experience is particularly effective in terms of promoting reflection skills, critical interpretation and analysis, both at individual and group level (Biasi, Patrizi, & Fagioli, 2020). It allows for a greater propensity for continuous and reasoned reflection, comparative analysis of information, construction of solutions to complex problems: «making blurred judgments, asking questions of a generative nature, posing sophisticated problems, making rich comparisons and connections and building complex interpretations» (Tishman, McKinney, & Straughn, 2007, p. 70). In particular, the experience of an artistic object recalls users' knowledge already acquired and facilitates interaction with it, building reasoned and as correct inferences as possible, digging under the surface to reach the complexity of interpretation.

The process of interpreting a work of art evokes the traditional attitudes of a critical thinker, from constructing hypotheses to testing them and producing inferences. Ritchhart says that museum users «look closely; wonder and question; make interpretations and form hypotheses based on

evidence; make connections to things they already know; consider different perspectives and viewpoints; delve below the surface to uncover complexity; and form conclusions» (2007, p. 139)

Especially in museum context, active learning strategies are defined more consistent with the idea of promoting transverse skills, both in terms of interaction with the object and with other visitors, in a constructivist perspective (Macdonald, 2006, p. 322). In particular, Visual Thinking Strategies (VTS) are defined effective in terms of critical thinking promotion, especially if associated with group discussion activities of the Inquiry-based learning approach. 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, Hubbard, Holtrop, & Higgins-Linder, 2016, p. 8). In particular, the use of VTS seems to allow a continuous reflection on the work of art and verification of the inferences made by the individual and others, supporting participants to make rigorous observation, critical deduction and to construct new knowledge in a collaborative way. Housen, in his numerous studies on the subject, has shown that through the use of VTS the promotion of critical thinking is associated with that of creative and aesthetic thinking (Housen, 2001). In order to promote VTS in different learning and aesthetic experiences, the literature suggests the use of further elaboration activities, even individual ones, such as the elaboration of a text from the object or the manual drawing, and then the organization of a collaborative discussion activity (Terrassa, Hubbard, Holtrop, & Higgins-Linder, 2016, p. 9) (*Fig. 1*).

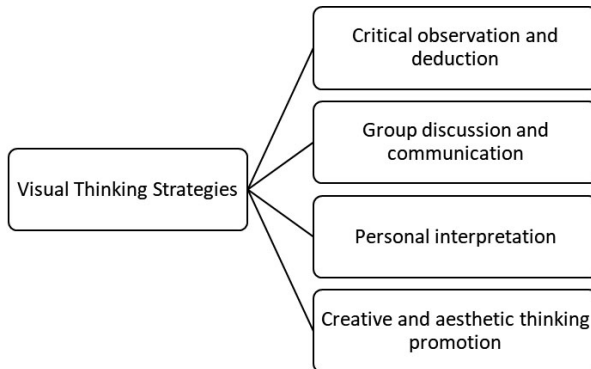


Figure 1. – VTS impact on users.

3. ASSESSING CRITICAL THINKING SKILLS IN THE DISCUSSION FORUMS

Critical thinking is recognized to be a pivotal skill, especially in the context of the so-called *knowledge and digital society*. Digital technologies are often demonized like a danger for critical and freedom thought, especially because social media platforms' algorithms do not always have transparent mechanisms of functioning (Pariser, 2011). On the other hand, there are many initiatives aimed at adopting digital environments to support dialogue, knowledge access and active and social participation into learning communities. Within this scenario, Massive Open Online Courses (MOOCs) could represent a way to promote Critical Thinking, thanks to Open Access and Open learning communities' principles. Social participation in MOOCs is mainly guaranteed by discussions forums. Research suggests that asynchronous online discussions can support critical thinking and knowledge co-construction even more than synchronous face-to-face discussions, due to the available time for reflection (Meyer, 2003) and more critical, constructive and explicit contributions (Wang, Woo, & Zhao, 2009).

Many approaches have been adopted to analyze critical thinking level in MOOCs discussion forums. One of the well-known and most adopted is the concept of cognitive presence developed by Garrison and colleagues (2001). Cognitive presence is defined as «the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry» (Garrison, Anderson, & Archer, 2001). Cognitive presence has been operationalized in different ways (e.g. Newman, Webb, & Cochrane, 1995 rubric for qualitative content analysis). However, analyzing Critical Thinking in MOOCs' discussion forums can be a challenge because texts produced are huge in the volume.

In recent years, to face the challenge of the analysis of big amount of educational data a new research field has been developed named *Learning Analytics*. Learning analytics focuses on extracting meaning from large amounts of data in educational digital environments. One of the largest datasets in education comes from MOOCs that typically feature in tens of thousands enrollments (Moore, Oliver, & Wang, 2019).

4. RESEARCH CONTEXT

The MOOC «Teaching Critical Thinking through Art» was created by the National Gallery of Art in Washington (DC), under the scientific supervision of the Harvard Project Zero researchers, which were the pioneer of VTS within the museum context (Tishman, MacGillivray, & Palmer, 1999).

The MOOC is structured following the phases involved in any critical thinking process. For each unit, there are practical exercises (e.g. routines) in which works of art are used. After the exercises, participants are invited to take part in different kinds of discussion forums, in order to ensure learning based on socio-constructivist processes (Kim, 2001). Whilst some forums required participants to reflect upon an exercise, in other forums participants can upload their products (e.g. didactic units), receive feedback and to comment products realized by other participants. Forums are not moderated by tutors and participants are free to provide a feedback to each other.

The MOOC includes interactive tools such as:

1. a zoom tool to examine the artwork at high resolution which allow users to manipulate the image and activate progressive inquiry processes (Hakkarainen, 2003);
2. surveys to compare personal thoughts with those of other participants;
3. demonstration videos of authentic lessons held within the museum, aimed at providing models of practices that can be reproduced by other teachers and educators in the classroom or in the museum.

The MOOC «Teaching Critical Thinking through Art» with the National Gallery of Art has the potential to stimulate participants critical thinking because it is based on carefully designed exercises related to the fruition of cultural heritage and pieces of art. In addition, the different kinds of discussion forums included in the MOOC can have a two-fold function: first, they can further support the development and the exercise of critical thinking among participants; secondly, they have the potential to support researchers and educators to assess and monitor critical thinking manifestations in dialogic interactions.

The MOOC is available through the EDX platform.

5. RESEARCH AIMS, QUESTIONS AND EXPECTED OUTCOMES

The paper is aimed at illustrating the results of a content analysis conducted on the forum section of the above-mentioned MOOC during the

2020 edition. In particular, 163 posts from «See/think/wonder» activity were assessed by two human evaluators using two different Critical Thinking evaluation tools (Garrison, Anderson, & Archer, 2001; Poce, 2017).

The present research will try to answer the following questions:

1. Which level of Critical Thinking are shown by the participants in the «See/think/wonder» activity of the MOOC?
2. Which variables can influence Critical Thinking level shown by the participants in the forums (age, gender, kinds of participation to the MOOC, kinds of discussion forums)?
3. Are there correlations between the linguistic characteristics of posts and critical thinking skills?

Thanks to the results of the present paper, it would be possible to realize the following expecting outcomes:

- developing a protocol for evaluating manually MOOC users' critical thinking skills;
- identifying useful insights about soliciting critical thinking skills through the virtual museum experience in digital learning contexts to improve further MOOC editions.

6. METHODOLOGY

6.1. *Research method*

The present research was conducted through different stages: firstly, a quantitative data analysis was carried out during the collection of all the posts from «See/think/wonder» activity; secondly, a qualitative data analysis was carried out, taking into consideration the evaluation activity done by two human evaluators using two different Critical Thinking evaluation tools (Garrison, Anderson, & Archer, 2001; Poce, 2017); lastly, an overall interpretation of data was made. The research design is a pilot study without a control group, based on content analysis of the forum users' written posts.

The MOOC users group was selected taking into consideration the number of participants: the forum of the «See/think/wonder» activity was the one where most responses were posted, except for Unit 0 forum, where users only had to introduce themselves. A total of 163 MOOC users' posts was used in this study.

In order to collect data from the forums on the EDX platform, it was necessary to write a program capable of browsing and saving forum

responses. The system, written in Python language, is based on the use of selenium and chromedriver to start a browser that automatically navigates through the forum pages. To access the processing, you need to enter valid platform credentials in the program configuration as well as the course and forum you wish to dump. Python automatically launches a browser that logs you in and sequentially performs the following operations:

- through an html parser, it saves the posts on the page (it finds the post and saves all the data);
- it automatically presses the button to load a new page of answers;
- it checks that the pages have not run out.

At the end, a json file is generated (choice made for compatibility reasons, in fact both the new non-relational db like mongodb but also the web services use this data exchange format). Then, a series of queries were made to perform a pre-selection of posts in order to eliminate noise from the data, generated by posts that were too synthetic or that had not received answers.

6.2. *Evaluation phases and tools*

Two independent evaluators adopted two different rubrics for Critical Thinking assessment on a corpus of 163 posts (Garrison, Anderson, & Archer, 2001; Poce, 2017). Moreover, the posts of one of the most productive user in the MOOC forums were selected and analysed as a case study: 23 posts from different forums, written throughout the duration of the MOOC and produced by user M., were analysed in terms of critical thinking skills, using the same evaluation rubric mentioned above.

Poce's critical thinking evaluation rubric is organized in six macro-indicators: *use of the language*, *justification*, *relevance*, *importance*, *critical evaluation*, and *novelty*. Posts can receive a score from 1 to 5 to each category:

- *use of the language* macro-indicator is useful to the teacher in order to assess the text language form;
- *justification* category evaluates users' ability to elaborate on their thesis and support their arguments throughout their written texts;
- *relevance* is a macro-indicator that analyzes users' text consistency, such as the correct use of outlines and users' capability to accurately use given stimuli;
- *importance* category evaluates the knowledge users use in their texts;
- *critical evaluation* macro-indicator shows users' critical thinking by evaluating personal and critical elaboration of sources, data and background knowledge;

- *novelty* category evaluates the use of new ideas and solutions associated with the initial hypothesis and users' personal thesis.

The evaluation tool elaborated by Garrison, Anderson and Archer (2001) is composed by 4 categories, which reflect the different stages of the critical thinking process and the means to create cognitive presence: triggering, exploration, integration and resolution:

- *triggering event* is the identification or recognition of an issue, problem, or dilemma that emerges from experience;
- *exploration* evaluates user activity to perceive or grasp the nature of the problem, and then move to a fuller exploration of relevant information;
- *integration* analyses the construction of meaning from the ideas generated in the exploratory phase;
- *resolution* shows the resolution of the dilemma or problem by means of direct or vicarious action (Garrison, Anderson, & Archer, 2001, pp. 10-11).

The method used to assess critical thinking presence in the corpus is content analysis.

7. RESULTS

7.1. *Users' critical thinking skills within the selected forum*

The averages of the assessments carried out in the double-blind mode by two evaluators were analysed by means of basic statistical analyses in order to verify the level of solicitation of the critical thinking indicators foreseen by the evaluation tools used.

Analyses show that the average score obtained by users through Poce's tool is 16.18 points (SD = 3.86). The macro-indicators that obtained the highest average scores is *Use of the language* and the one that received on average the lowest scores is *Critical Evaluation*. The distribution of scores given to the *Use of the language* macro-indicator shows a platokurtic curve ($K = -0.21$), with a high distribution of the scores 3 and 4.

The modal profile of the user who participated in the forum received a total score of 14 points of which 3 were assigned to *Relevance* and *Use of the Language* macro-indicators and 2 to the other macro-indicators (Fig. 2).

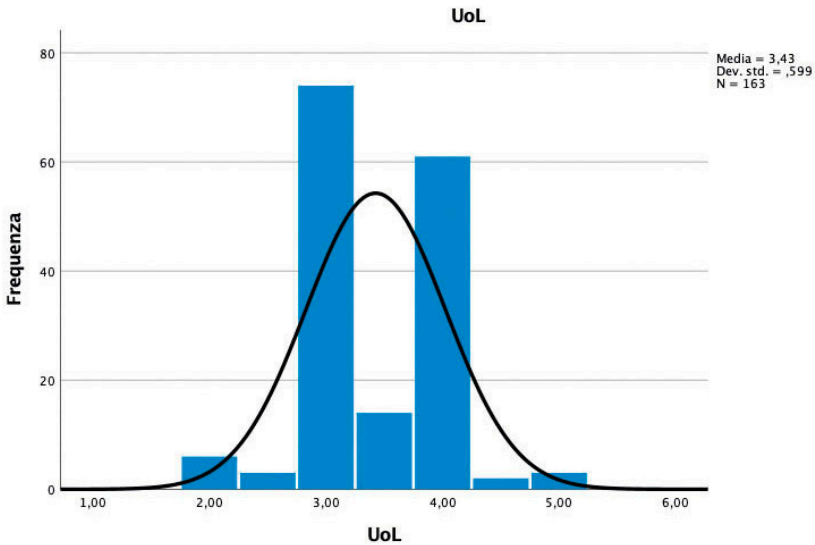


Figure 2. – Scores distribution of «Use of the language» macro-indicator.

As already shown in previous research, based on Poce's evaluation rubric, also in this case there is a strong positive correlation among all CT the macro-indicators: as the scores assigned to a macro-indicator increase, the scores of the other macro-indicators increase as well ($p < 0.01$, Pearson's correlation coefficient).

As regards scores assigned to Garrison and colleagues' evaluation tool, the most represented category in the texts written by the users seems to be *exploration*: the two evaluators assigned on average 89% of the posts to this category, while only 15% to the *triggering event* and 12% to *integration* indicators. The least represented category within the assigned scores is *resolution* (Fig. 3).

Analysing the correlations between the scores assigned to the four Garrison and colleagues' categories, it can be seen that the *integration* and *resolution* categories are strongly positively correlated ($p < 0.01$, Pearson's correlation coefficient). In general, forum users demonstrate to shift between the personal interpretation of the work of art and the exploration of new «social» ideas: through the use of a critical reflection, they select information defined relevant to the issue of the activity (See/think/wonder), questioning and exchanging information each other.

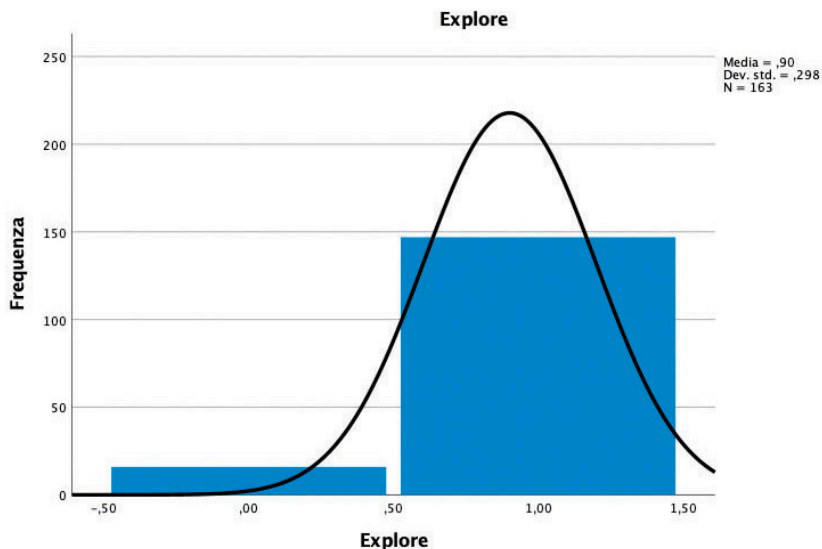


Figure 3. – Scores distribution of «Exploration» indicator.

In addition, all Garrison and colleagues' categories have a strong positive correlation with the average total scores obtained, using Poce's critical thinking evaluation rubric ($p < 0.01$, Pearson's correlation coefficient): by analysing the overall levels of critical thinking skills of the posts written by forum users, it is possible to identify whether the different stages of the critical thinking process have been solicited or not.

7.2. Users case study

M., a user of Peruvian origin, is an English teacher who participated in the 2020 edition of the online course «Teaching Critical Thinking through Art» offered by the National Gallery of Art, contributing to all the discussion forums in the four units of the course with 23 posts.

Figure 4 represents the average of the scores achieved in the various units, out of a maximum of 30 points, and shows a slightly increasing trend from the first to the fourth unit, with a slight decrease in the third unit.

By looking at the scores assigned to the individual responses, shown in the chart below, you may notice that the 10th and 23rd posts obtain the highest scores, 24.5 and 25 respectively, contributing to increasing the average score of the second and fourth units to which they belong (Fig. 5).

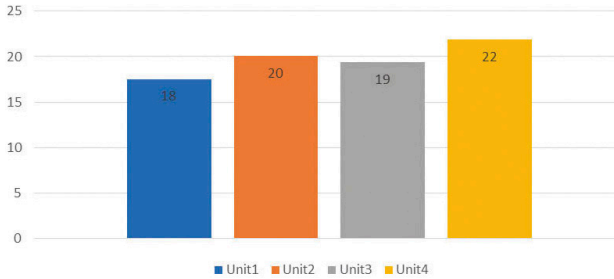


Figure 4. – Overall Critical Thinking scores assigned to M. in the different MOOC unit.

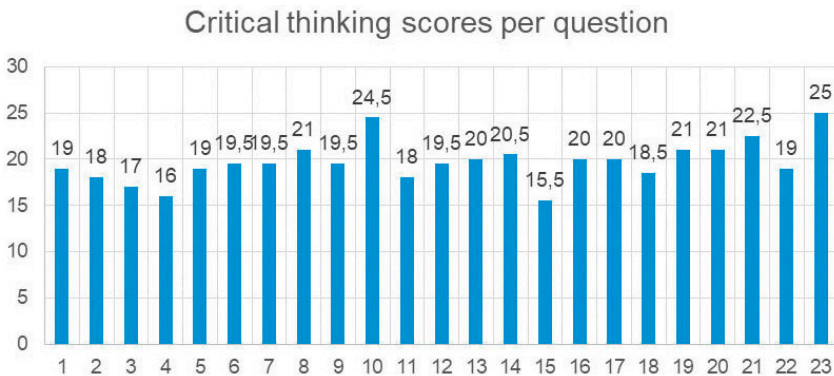


Figure 5. – Critical Thinking scores assigned to M. in the different forums.

For example, the 10th discussion forum, called the «Elaboration Game in Your Practice» activity, asked users to explain how they could employ the method called «Elaboration Game» in their own teaching area. M. user's answer is the following: «So first, I would have students looking at the picture quadrant by quadrant, then I'll tell them to discuss with their classmates what they could observe, and then, I would elicit their answers and will lead to the main topic which is being proud of our roots/origin», showing a greater degree of argumentation and critical processing than other shorter and more concise posts by the same user.

Compared to the post content, it is hard to observe clear trends: in both posts with the highest score, the user explains the use of specific methods in the work. This could suggest that the user is more involved when discussing personal experiences and suggesting solutions rather than when participating directly in the activity of «artful thinking». However, there are also several

posts where the user participates to the activities that obtain higher scores compared to others in which M. shares some personal work experiences. Thus, it is hard to associate a greater interest in specific types of question.

Nonetheless, in the following chart (Fig. 6), the user appears to obtain better scores when the posts include suggestions and solutions, that is when they are included in the «integrate» and «resolution» phases proposed by Garrison and colleagues.

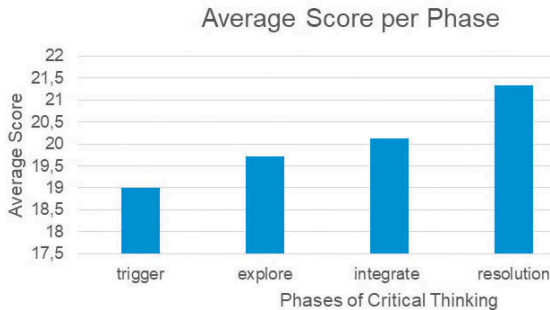


Figure 6. – Average Critical Thinking scores assigned to Garrison, Anderson and Archer (2001) macro-indicators.

The posts length is highly variable and there are not distinctive trends. However, there seems to be a mild correlation ($r = 0.5592$) between the number of characters in a post and the total score obtained, since longer posts usually have a clearer presentation of the arguments and a greater critical processing (Fig. 7).

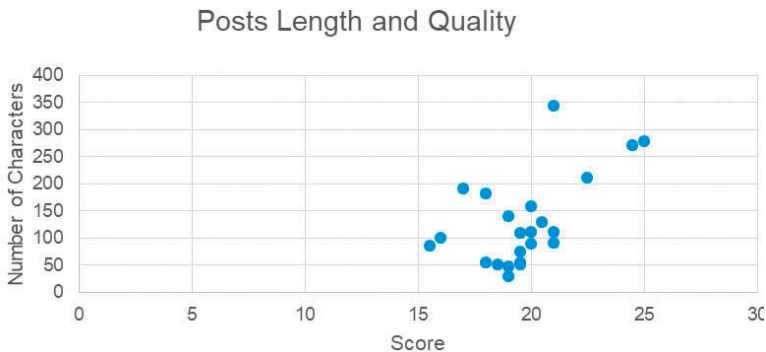


Figure 7. – Correlation between numbers of characters and average scores assigned to the case study posts.

8. CONCLUSIONS

In recent years, the use of innovative learning strategies to promote and assess critical thinking skills within museum education context have been greatly enhanced. Starting from the identification of a correlation between virtual museum experience and the promotion of critical thinking, defined as effective in many studies in the field, the present research focused on the issue of evaluating critical thinking skills in a particular in the MOOC learning context, in order to illustrate examples of protocols for assessing critical thinking through online writing activities and to provide useful insights about soliciting this skill through the aesthetic experience in digital learning contexts.

Through the content analysis carried out on 163 posts of a MOOC «Teaching Critical Thinking through Art» forum and the case study of user M., it is possible to state that, in general, users show a good level of use of the language and critical evaluation of sources in written texts. Moreover, the «See/think/wonder» activity promotes in them an attitude of exploration of relevant information in order to solve a specific problem.

From the case study analysis, the length of the posts seems to influence the level of critical thinking solicited by the forums activity: the longer the text, the higher the probability of receiving a high score in the critical thinking macro-indicators. In addition, user M. improves his/her critical thinking skills by participating in all MOOC forums related to aesthetic experiences.

However, there is still extensive room for improvement and the limited number of participants does not allow generalizations of the results. The research methodology used and the type of analysis carried out could be modified and implemented in order to identify the correlation with other variables not considered in this study. Moreover, with a larger sample it would be possible to analyse all the MOOC forum and identify other variables that can influence Critical Thinking level.

REFERENCES

- Biasi, V., Patrizi, N., & Fagioli, S. (2020). Attenzione ed esperienza estetica nella comunicazione didattica. Studi empirici per il superamento dello svantaggio socio-culturale nella scuola secondaria. In A. Poce (a cura di), *Memoria inclusione e fruizione del patrimonio culturale. Primi risultati del progetto Inclusive Memory dell'Università Roma Tre* (pp. 109-129). Napoli: ESI.

- Carretero Gomez, S., Vuorikari, R., & Punie, Y. (2017). *DigComp 2.1: The digital competence framework for citizens with eight proficiency levels and examples of use*. Luxembourg: Publications Office of the European Union.
- Deloitte (2018). *Skills gap in manufacturing study – Future of manufacturing: The jobs are here, but where are the people?* <https://www2.deloitte.com/us/en/pages/manufacturing/articles/future-of-manufacturing-skills-gap-study.html>
- Facione, P. (1990). *Executive summary of the Delphi Report*. Millbrae, CA: The California Academic Press.
- Garrison, D., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, 15, 7-23.
- 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). Aesthetic thought, critical thinking and transfer. *Arts and Learning Research*, 18(1), 99-132.
- Johnson, R. H., & Hamby, B. (2015). A meta-level approach to the problem of defining «critical thinking». *Argumentation*, 29(4), 417-430.
- Kim, B. (2001). Social constructivism. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. <http://epltt.coe.uga.edu/>
- Kuhn, D. (2019). Critical thinking as discourse. *Human Development*, 62(3), 146-164.
- Macdonald, S. (Ed.). (2006). *A companion to museum studies*. Malden, MA: Blackwell.
- Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher order thinking. *Journal of Asynchronous Learning Networks*, 7(3), 55-65.
- Moore, R., Oliver, K., & Wang, C. (2019). Setting the pace: Examining cognitive processing in MOOC discussion forums with automatic text analysis. *Interactive Learning Environments*, 27, 1-15.
- Moore, T. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education*, 38(4), 506-522.
- Newman, D. R., Webb, B., & Cochrane, C. (1995). A content analysis method to measure critical thinking in face-to-face and computer supported group learning. *Interpersonal Computing and Technology*, 3(2), 56-77.
- Pariser, E. (2011). *The filter bubble: How the new personalized web is changing what we read and how we think*. Westminster: Penguin.
- Poce, A. (2017). *Verba Sequentur. Pensiero e scrittura per uno sviluppo critico delle competenze nella scuola secondaria / Verba Sequentur. Thinking and writing for a critical development of competences at secondary school*. Milano: FrancoAngeli.

- Poce, A., Caccamo, A., Amenduni, F., Re, M. R., De Medio, C., & Valente, M. (2020). A virtual reality Etruscan museum exhibition: Preliminary results of the participants' experience. In AA.VV., *Enhancing the human experience of learning with technology: New challenges for research into digital, open, distance and networked education*. Conference Proceedings EDEN 2020, Lisbon, October 22-23 (pp. 40-49). doi: <https://doi.org/10.38069/eden-conf-2020-rw-0005>
- Re, M. R. (2020). Promuovere il pensiero critico attraverso la fruizione e l'interpretazione dell'opera d'arte. In A. Poce (a cura di), *Lo studio del canone nella cultura occidentale e la valutazione del pensiero critico / The Study of the Western culture canon and critical thinking assessment* (pp. 83-108). Napoli: Edizioni Scientifiche Italiane.
- Ritchhart, R. (2007). Cultivating a culture of thinking in museums. *Journal of Museum Education*, 32(2), 137-154.
- Scott, C. L. (2015). The futures of learning 3: What kind of pedagogies for the 21st century. *Education Research and Foresight*, 15, 1-21.
- Terrassa, J., Hubard, O., Holtrop, E., & Higgins-Linder, M. (2016). *Impact of art museum programs on students: Literature review*. Alexandria, VA: National Art Education Association.
- Tishman, S., MacGillivray, D., & Palmer, P. (1999). *Investigating the educational impact and potential of the Museum of Modern Art's visual thinking curriculum*. Cambridge: Harvard Project Zero.
- Tishman, S., McKinney, A., & Straughn, C. (2007). *Study center learning: An investigation of the educational power and potential of the Harvard University Art Museums Study Centers*. Cambridge, MA: Harvard University Art Museums and Harvard Project Zero.
- Wang, Q., Woo, H. L., & Zhao, J. (2009). Investigating critical thinking and knowledge construction in an interactive learning environment. *Interactive Learning Environments*, 17(1), 95-104.
- World Economic Forum (2021). *Upskilling for shared prosperity*. Insight report. http://www3.weforum.org/docs/WEF_Upskilling_for_Shared_Prospersity_2021.pdf

ABSTRACT

Negli ultimi anni, l'uso di strategie di apprendimento innovative nel contesto dell'educazione museale è notevolmente aumentato grazie all'uso di tecnologie digitali, soprattutto in termini di promozione del pensiero critico. Come sottolineato da diversi studi del settore, l'esperienza estetica è particolarmente efficace in termini di promozione delle capacità di riflessione, interpretazione e analisi critica, sia individuale che di gruppo, nonché

di reinterpretazione personale e creativa (Biasi, Patrizi, & Fagioli, 2020). Il presente articolo descrive una ricerca condotta all'interno del MOOC, «Teaching Critical Thinking through Art», realizzata dalla National Gallery of Art di Washington (DC), sotto la supervisione scientifica dei ricercatori dell'Harvard Project Zero, pionieri dell'uso della metodologia del Visual Thinking in contesto museale. L'articolo si propone di illustrare i risultati di un'analisi di contenuto condotta sulla sezione forum del suddetto MOOC durante l'edizione 2020. In particolare, 163 post dell'attività «See/think/wonder» sono stati valutati da due valutatori umani utilizzando due diversi strumenti di valutazione del pensiero critico (Garrison, Anderson, & Archer, 2001; Poce, 2017). Inoltre, sono state condotte analisi specifiche sulle attività di scrittura di utenti selezionati, al fine di individuare possibili correlazioni positive tra le caratteristiche dei post del forum e le abilità di pensiero critico sollecitate.

Parole chiave: Apprendimento digitale; Educazione museale; Esperienza estetica; MOOC; Pensiero critico.

How to cite this Paper: Poce, A. (2021). Virtual museum experience for critical thinking development: First results from the National Gallery of Art (MOOC, US) [Esperienza museale virtuale per lo sviluppo del pensiero critico: primi risultati della National Gallery of Art (MOOC, US)]. *Journal of Educational, Cultural and Psychological Studies*, 24, 67-83. DOI: <https://dx.doi.org/10.7358/ecps-2021-024-poce>