Using different learning methodologies and tools to exploit the educational impact of a University Art Collection: a pilot phase at Roma Tre University (IT)

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Abstract

The Centre for Museum Studies based at University Roma Tre (IT) has designed and implemented a museum educational programme aimed at promoting the "Tito Rossini" contemporary art collection donated by the artist in 2017 to the Department of Education. The educational programme foresees the use of innovative and digital education methodologies and tools (e.g. Digital Storytelling, Augmented Reality and Gamification) and is addressed to university and external users. A pilot study with university students was carried out in order to verify the achievement of some objectives of the programme designed for the exhibition. This experience addresses the need for personalised educational museum paths in view of promoting social inclusion and transverse skills, focusing on critical thinking in particular.

Introduction

Roma Tre University was founded in 1992 and is one of the youngest universities in Rome. The Departments, located in different areas of the city, have few university museum collections: for this reason, in 2014 the University promoted the *Roma Tre Contemporary Art Collection*, to support the use and knowledge of Italian contemporary art among students, teachers and the local community. Italian and foreign artists have donated artworks to various departments that have set up specific exhibitions in the university spaces, open to the university and external users. The *Roma Tre Contemporary Art Collection* cannot be considered a traditional university museum, given the genesis and characteristics of the artworks, but in some contexts it is used for educational purposes. The Collection of the Department of Education, in particular, consists of 38 artworks by the Italian contemporary artist Tito Rossini, who donated the paintings in 2017. The Centre for Museum Studies (CDM), based at the Department of Education, created different mediation tools to develop the knowledge of the collection within the university and for external users and to support social inclusion: these aims are carried out through the use of active teaching methodologies (e.g. Digital Storytelling, Visual Thinking) and transverse skills promotion in a Lifelong Learning perspective (POCE & RE 2019). Specifically, over the years the CDM has carried out two initiatives in such a framework: 1- the study on the non-visitors of the collection and the ways of publicizing the collection itself, 2- the creation of personalized educational paths within the exhibition, involving university students and in-training museum educators in a design meant to to promote transverse skills (POCE & RE 2019). Starting from the studies and activities previously carried out, the CDM implemented the museum educational paths of the "Tito Rossini" collection with digital teaching tools and methodology (e.g. Augmented Reality and Gamification) addressed to two macro-categories of users: university students and external visitors.

Different research documents in the field of university museum education highlighted the role of digital and emergent technologies to make museum collections more accessible through digital media to a wider audience. Museums and cultural institutions use mobile applications to provide personalized learning paths, enhance user experience, attract new visitors and fulfill special educational needs (GAETA et al. 2009). QR codes, smartphone apps and Augmented Reality (DING 2017) can enhance users' experience and promote the interaction with real-world objects and artworks included in museum collections, thus supporting transverse skills

and social inclusion (SANDELL 2002; NARDI 2014; POCE 2020).

The museum program conceived for the Tito Rossini Collection and addressed to university students and in-training educators has different purposes: by participating in the path designed in the framework of cultural and social inclusion (POCE 2020), reflecting on mediation and didactic tools, carrying out personalised education activities within the collection, students are encouraged to develop both professional (e.g. educational design, evaluation) and transversal skills (critical thinking, metacognition). This way, the *Rome Tre Contemporary Art Collection* is integrated in students' educational curriculum and plays a didactic role within the Department.

This contribution presents the results of the pilot phase of the the "Tito Rossini" collection education programme involving 29 students from the Department of Education, University Roma Tre.

Building personalised and inclusive paths for university art collections: the context of the research

The use of active teaching methods is defined as extremely effective in pedagogical terms for the promotion of transverse competences (HOOPER-GREENHILL 1994; HEIN 1998; MARSTINE 2006; MATEUS- BERR 2015). The use of digital tools can further support the promotion of the so-called 4C skills (creativity, communication, collaboration and critical thinking, TRILLING & FADEL 2009) if it stimulates the most transverse skills and attitudes, such as the critical use of technologies (POCE 2012), and supports the definition of personalised learning paths according to users' educational needs. Many experiences and projects in the field have underlined how the technology-museum-skills link is effective from an educational point of view in all categories of users, starting from children (PARRY 2010; ADAMS et al. 2007; POCE 2018). Among the most effective educational methodologies, Digital Storytelling and Visual Thinking, given their characteristics, are suitable for the promotion of critical thinking in museum contexts (HUBARD 2011; LIGUORI & RAPPOPORT 2018).

Moreover, also in museum contexts, the realization of personalised learning path is closely connected to social inclusion and educational effectiveness: responding to the educational needs of visitors, through the creation of pedagogically consistent paths, is essential for deep and lifelong learning and promotes cultural inclusion of socially disadvantaged categories, such as users with Special Educational Needs (POCE 2020).

It is from these considerations that the CDM has designed the Tito Rossini collection education programme for university students. The main aims of the initiative were: to create interactive tools for the fruition of Rossini's

collection exhibited at the University of Roma Tre; to increase visitors' knowledge about Rossini and his exhibition; to promote students' 4C skills. In order to create an engaging user's experience, Rossini's exhibition was equipped with different mediation tools.

The Tito Rossini collection education programme

In the first stage of the project, QR Codes linked to audio descriptions, short stories and music tracks developed by Roma Tre university students were implemented. The QR codes allow access to content created through the Visual Thinking and Digital Storytelling approach, promoting users' and students' creativity in a co-design perspective. Indeed, the initiative was co-designed by involving not only the team of experts from CDM, but also master degree and post-graduate students who contributed to the transformation of their learning space, developing a sense of ownership toward the university museum collection (AAMG 2017; POCE & RE 2019).

In a second stage of the project, researchers developed an Augmented Reality gamified learning path: users and students were immersed in an augmented reality experience where, moving from one painting to another, they were asked to interact answering questions, whose contents are adapted according to the subject framed. Positive advancement in the game generated a final question that made the students reflect critically on the entire exhibition path.

At different stages, the project has combined non-conventional pedagogical practices (Visual Thinking, Digital Storytelling, Personalization), technologies (QR codes, Augmented Reality, Web Application) and 4C skills promotion (creativity, communication, collaboration, critical thinking) (TRILLING & FADEL 2009).

The design of the learning programme is the following:

1. At the beginning of the visit, users are required to fill in a questionnaire aimed at investigating personal information (gender, age, personality, artistic preference, interests). According to the answers provided, the web-app suggests a personalized learning path.

2. An Avatar asks questions to users, through a gamified concept of the web-app.

3. At the end of the visit, participants are invited to assess their experience. This way, it was possible to test the hypothesis according to which the personalized learning path was correctly matched with the users' needs.

Methodology

Two experimental activities were held at the Department of Education-Roma Tre University, based on a multimodal use of the contemporary art

Fig. 1 Visualizations of the web-app presented in the first experimentation (mobile phone, on the left) and in the second experimentation (Augmented Reality Avatar, on the right)
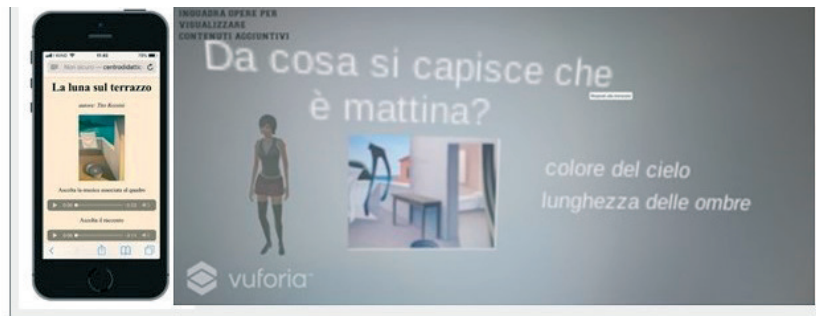
permanent exhibition *Tito Rossini,* involving 29 students in total (Female = 25; Male = 2; Gender not specified = 2; Average age: 30,5; SD = 5,1). on both the occasions, the time devoted to the experience was two hours in total. In the initial phase, a brief introduction on the artist 's biographical notes and a focus on the themes developed within his works were presented.

At the beginning of the first event, participants (N = 15; Female = 13; Male =2; Average age= 36 SD = 6,7) were required to fill in a questionnaire through a mobile app created on purpose identify personal details and preferences. After that, they had the opportunity to visit the Tito Rossini permanent exhibition for approximately 60 minutes. Participants were invited to use a QR code to access the paintings' written and audio descriptions, related short stories and music tracks. After the visit, participants filled in a second questionnaires in which they were invited to express their preference on paintings and mediation tools. Participants' answers were automatically recorded by the web-app and converted in an excel-sheet.

In the second experimentation, at the end of the visit, students (N = 14; Average age = 25; SD = 3,5; Female = 12; Gender not specified = 2) were asked to fill in a questionnaire created through Google modules. The questionnaire was filled in anonymously in order to protect participants' privacy and allowing them to feel free of providing negative feedback regarding the exhibition.

On both the events, the questionnaires were designed ad-hoc by the researchers and they included the following sections:

1. Personal information such as gender, age and occupation (closed questions).

2. Students' previous knowledge about the Tito Rossini exhibition. For example, participants were asked to indicate if they knew the exhibition and the artist before the visit (closed questions).

3. Evaluation of students' learning experience, and suggestions for improving the learning path. Students were asked to assess different features, such as QR codes, soundtracks, AR animations (both open-ended and closed questions). Closed questions in this section are expressed on a Likert scale from 1 (totally disagree) to 5 (totally agree).

4. Only in the second experimentation students' critical reflection skills were assessed through a short open-ended answer. The question used to stimulate and assess their Critical Thinking level was 'From your point of view, what is the role of university museums in the wider city museum system? What function do they have for the territory and what for the University? What role can technology play in university museums?'

Data analysis

Different kinds of analysis were carried out on the data collected. Descriptive statistics were calculated on quantitative data collected through closed-ended questions (sections 1, 2 and 3). A thematic analysis was applied to the open-ended-questions in sections 3. Thematic analysis is related to the classification of the patterns presented from qualitative data into themes. Through this technique, it is possible to bring together components or fragments of ideas or experiences, which often are meaningless when taken alone (ARONSON 1995). The aim of the thematic analysis was recognized if participants spontaneously mentioned themes related to Critical Thinking.

Finally, the last open-ended question was treated with content analysis to assess critical thinking (POCE 2017) levels. The critical thinking assessment model adopted is based on six macro-indicators: use of language, argumentation, relevance, importance, critical evaluation and novelty. Each macro-indicator can be assessed with a minimum score of 1 to a maximum score of 5. Thus, the maximum score possible is 30.

Results and discussion

From the total of 29 participants, 20 students had never heard about the artist Tito Rossini, 8 knew something about him and only one declared to know the artist very well. In addition, 13 students had noticed the exhibition in the University building before the visit, whilst 16 had never noticed the exhibition before. These preliminary results show that the exhibition is not sufficiently exploited and promoted at the Departmental Level.

In the first experimentation, participants reported a general interest for the exhibition. Multimodality and the Digital Storytelling approach were generally appreciated. On the other hand, short stories and music tracks received an average lower score than the median score (less than 2,5 out of 5). After the visit, most of the participants reported curiosity towards the painting collection (53%). In contrast, 20% of the participants were bored during the exhibition and some of them felt restless. 53,3% would suggest visiting the exhibition to other people, whilst the rest would not. Further research will be necessary to understand the reasons for this contrasting view toward the exhibition. However, from our preliminary analysis we

assumed that participants' personal characteristics and their level of digital skills could affect their evaluations (POCE & RE 2019). Moreover, from a Focus Group carried out a few weeks after the experimentation, we were able to better explore the reasons for the dissatisfaction of the participants toward the soundtrack and the narratives. Below is an excerpt in which three participants co-construct their critical reflections on the narratives and audio tracks.

> 3M: "I think storytelling can be improved".
>
> 1F: "Do you mean storytelling contents?"
>
> 3M: "Yes, yes".
>
> 3M: "Contents and also the reading ... ".
>
> Participant 1F: "Let's say that the acting was not very engaging".
>
> Participant 4F: "I had the feeling that the narrator definitely wasn't the person who wrote the story, I don't know why, I immediately felt it... "

In the second experimentation, participants expressed generally positive comments toward the visit. "Multi-modality" was strongly appreciated (Average = 4,14) as well as the "Overall learning path" (Average = 3,9). The following figure shows a comparison of the participants assessment toward the (1) overall learning programme (2) multimodality (3) and the different kinds of technologies and mediation tools employed in the two experiments. Whilst in the first experimentation mediation tools received an average score lower than 3, in the second experimentation the mediation tools received an average score higher than 3.5.

From the theme analysis carried out in the second experimentation, the following topics emerged (Figure 1): *inquisitiveness* (25,93%) and *synthesis* (7,41%), topics that are both connected to Critical Thinking skills and dispositions. Some topics related with Visual Thinking also emerged such as *Art* (14,81%), *visualization* (16,679) and *innovation* (1,85%). Other topics, which emerged from participants' answers, are *technology* (18,52%), *collaboration* (5,56%), *travel* (5,56%), and *struggling* (3,7%). The topic of
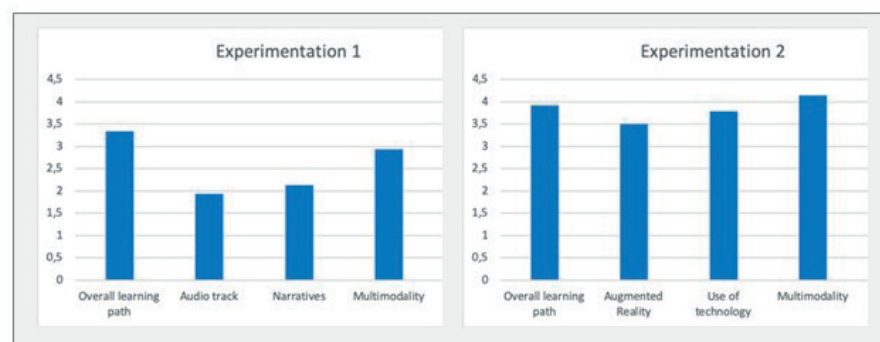

Fig. 2 Evaluation of the programme and tools in the first and second experimentations

travel was associated with the topic of *art* through a meaningful metaphor used by one of the participants: "*The exhibition was a journey through painted windows*".

The most appreciated features of the exhibition in the second experimentation were the opportunity to identify a *Fil Rouge* among the paintings and to be stimulated by questions designed to support critical reflection. Participants would also like to have the time to focus on the other paintings and they did not always appreciate the arrangement of the paintings in the building.

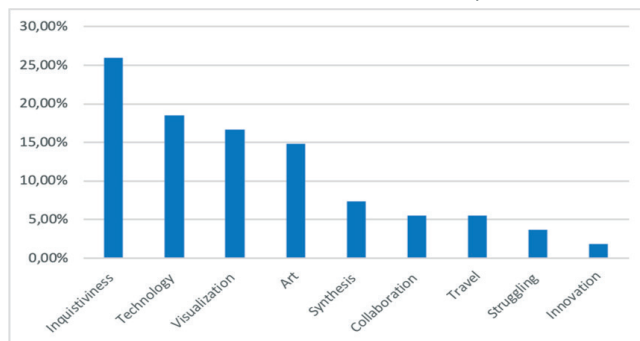At the end, 10 out 14 students answered the last question which asked them to reflect upon the role of university museums. All the students obtained a score higher than 18/30 which indicates satisfactory level of Critical Thinking[1]. Only three students obtained scores higher than 25/30 which indicates a high level of Critical Thinking. One of the students wrote the following contribution in the last question:

Fig. 3 Emergent topics in participants' open-ended answers

"*Universities offer numerous works of art that are often not valued. It would be an opportunity to bring the students' attention to them, perhaps even by making "alternative" lessons, not necessarily for museum didactics: to get out of the face-to-face didactics in university rooms and instead have classes among the works that surround us. I believe that if developed to the fullest, technology can be an excellent stimulus to encourage visitors to better observe the works and reflect on them.*"

Conclusion and future developments

To sum up, university museums provide unique opportunities to actively fulfill critical mission statements of higher education institutions. Thus, it is necessary to think about efficient strategies to exploit University cultural heritage resources. Research has highlighted the role of digital technologies and active learning methodologies to improve users' experience through university art collections. Students that took part in different pilot activities, through specific learning methodologies (Digital Storytelling, Visual Thinking, Gamification) and tools (Augmented Reality), expressed an overall positive evaluation and seemed to activate their transverse skills, Critical Thinking in particular, and Critical Knowledge about the role that University museums and art collections paid for a personal and community development. The use of co-design activities for the innovative and personalised tools and paths provide a broad educational experience which involve participants and the

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1   In the Italian system, 18 corresponds to the minimum score to pass a University exam http://attiministeriali.miur.it/media/240734/allegato_5.pdf

community, supporting collaborative opportunities and emphasizing cross-cultural understanding and social inclusion (AAMG 2017).

A further pilot phase of the project is necessary with the participation of external users and different types of visitors, in order to collect different data that should verify the efficacy and the appreciation of the learning path. Furthermore, the use of other digital tools could be envisaged for the realisation of active learning methodologies and transverse skills promotion; moreover, an analysis of the relationship between technologies and personalised learning pathways in Tito Rossini exhibition should be developed.

Authors contribution

The contribution was edited in the following order: A. Poce (*Introductions*; *Building personalised and inclusive paths for university art collections: the context of the research*; *Conclusion and future developments*), M. R. Re (*Methodology*), F. Amenduni (*Results and discussion*), C. De Medio (*Data analysis*) and M. Valente (*The Tito Rossini collection education programme*).

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