Outreach Experiences in Quantum Science through Creative Approaches

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Abstract: We report outreach activities using creativity-based, participatory methods to communicate quantum mechanics and technologies across educational and public contexts, demonstrating improved accessibility, engagement, and understanding of the second quantum revolution.

Recent advances in quantum technologies are driving what is often referred to as the second quantum revolution, with significant implications for science, industry, and society. However, the abstract and counterintuitive nature of quantum mechanics poses well-known challenges for effective communication, particularly when addressing non-specialist audiences such as students or the general public. Within this context, we designed and implemented a set of outreach activities aimed at introducing key concepts of quantum mechanics, quantum technologies, and their broader cultural and societal impact.

The primary objective of these activities was to provide accessible entry points to quantum science in both formal educational settings and informal public engagement contexts. A central methodological choice was the adoption of approaches based on creativity and active participation, moving beyond traditional lecture-based formats. These approaches were intended to foster personal engagement, facilitate conceptual understanding through indirect representation, and stimulate reflection on the implications of quantum science for contemporary thought [1].

One of the main initiatives was the launch of a “Quantum Creativity” contest, organized in conjunction with the World Quantum Day and the Italian Quantum Weeks. The contest invited participants to interpret quantum concepts through creative media, including comics, poetry, videos, games, and visual artworks. More than 30 submissions were received, demonstrating a wide range of interpretations and levels of engagement. Importantly, the contest also served as a catalyst for school-based projects, enabling teachers and students to integrate quantum-related topics into interdisciplinary educational activities.

In parallel, outreach actions were carried out within large-scale public events characterized by high attendance and heterogeneous audiences, such as Lucca Comics & Games, Play Festival in Modena, Rome Video Game Lab, and the European Researchers’ Night. In these contexts, interactive sessions with researchers were combined with the use of the science communication board game “Quantum Race” [2]. The game is designed to translate selected principles of quantum mechanics into simplified mechanics and narratives, enabling participants to explore quantum-inspired dynamics through gameplay. This approach proved effective in lowering access barriers and promoting dialogue between researchers and the public.

A further initiative was developed in Latina, in collaboration with the OpenHub of the Lazio Region and the MADXI contemporary art museum. An artistic contest was launched involving local artists and several schools, accompanied by a structured outreach program consisting of five meetings dedicated to quantum mechanics themes. These meetings brought together researchers, artists, and students, fostering interdisciplinary exchange. The outcome of this process was the production of 13 artworks, including one sculpture, ten paintings, and two performance pieces. The works were exhibited at the MADXI museum, culminating in a public vernissage held on December 22, 2025.

Overall, the activities presented here highlight the potential of creativity-based and participatory methodologies in quantum science outreach. By engaging diverse audiences through multiple expressive channels—art, games, and narrative formats—it is possible to address the intrinsic complexity of quantum concepts while maintaining scientific coherence. The results suggest that such approaches can enhance accessibility, stimulate curiosity, and support a more informed public understanding of the ongoing quantum technological transformation.

References

[1] Di Paolo, R., Bisanti, M., Chiarello, F., Di Guida, S., & Pizziol, V., “Games-based learning for social change.” Frontiers in Education, 9, 1403695 (2024).

[2] F. Chiarello, M. G. Castellano. "Board games and board game design as learning tools for complex scientific concepts: Some experiences." International Journal of Game-Based Learning, 6.2 (2016)