Optics LAB as a base for transdisciplinary knowledge between Art and Science

Josep Vidal[1*], Manuel Cirauqui[2], Tatiana Kourochkina[3], Tere Badia[4], Juan Carlos Escalera[1], Carla Rodríguez[1], Albert van Eeckhout[1], Juan Campos[1], Maria J. Yzuel[1], Àngel Lizana[1].

[1] *Grupd'Òptica, Physics Department, Universitat Autònoma de Barcelona, Bellaterra 08193, Spain*
[2]*EINA Centre Universitari de Disseny i Art de Barcelona, 08017, Barcelona, Spain*
[3]*Quo Artis Foundation, 08025, Barcelona, Spain*
[4] *Culture Action Europe, 1000, Brussels, Belgium*
2085344@uab.cat

Abstract: Students from the subject "Optics Laboratory" at the University received visits from different agents from the contemporary art context, creating transdisciplinary relationships between Science and Art through Light, enriching all parties involved.

1. Introduction

1.1. Optics Laboratory

"Laboratori d'Òptica" (Optics Laboratory, OL) is a compulsory subject taught during the third academic year of the Physics degree (and double degrees of Mathematics and Physics and/or Chemistry and Physics) at the Autonomous University of Barcelona (UAB). Last year we had more than 100 students that discovered, for the first time, what an optics laboratory is. In OL, students have an experimental approach to Optics through a series of 10 different experiments related to polarization, light reflection-refraction, interferences and diffraction, among others. The students, in pairs, perform 7 of these 10 experimental stages during the academic course and write the corresponding experience reports. So at the end, they have an overview of the most important phenomena in Optics [1]. Also, they reinforce the content seen in their theoretical classes, and maybe even more importantly, they have a first approach to an experimental experience in the Optics Field.

1.2. Light in Art

Light and Art are two concepts/disciplines that have always worked together. Let's say that a lot of things can't be conceived of without Light or the Study of Light, and Art is one of them. Artists use Light, in paintings, sculptures, installations, performances, photography, and a lot of other techniques [2]. And not only do they use it as a basis for their work, but also as a main subject for their works and projects. Also, there are a lot of light and art festivals around the world.

2. Transdisciplinary knowledge

Multidisciplinary and transdisciplinary learning processes are one of the leading models in Education nowadays [3]. Furthermore, the European Union is working on having this multidisciplinarity as much as possible in our society with projects such as the European Bauhaus [4]. This mix of different knowledge sources is the reason for double degrees such as Mathematics and Physics or Chemistry and Physics, which are also offered at the UAB and which have a high demand. For instance, the double Degree in Mathematics and Physics is a very selective degree, to which only the students with top grades in Spain have access. Unfortunately, worldwide there are very few programs in Art and Science. In general, both fields are presented as independent. For this reason, there is a gap between Art and Science during the academic learning process.

In the Optics Laboratory there were some very ephemeral interactions between Art and Science, and this year we started a process wherein light and its phenomena will ideally become in the near future a basis for a hybrid space where things happen.

2.1. Case study of three visits

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As a starting point for this upcoming hybrid space, during this academic year in the Optics Laboratory we received, on separate days and in different groups, visits from three different agents from the local contemporary art context: a curator, a director of an Art and Science Foundation and an artist. Each of them came for different main reasons, but all of them were very curious and eager to see this laboratory and the students working on 10 optics principles. At the beginning of the experimental session (experimental sessions last about four hours), and before the visitors came, the teachers involved explained to the students that a visitor (each time different) from the art context was coming to see the laboratory and interact with them, and why he/she was very interested in visiting and seeing the optical experiments. Also, teachers encouraged the students to participate in a flipped classroom approach, and during the experimental session, to explain to visitors the general view of the experimental stage that they were conducting, or to explain something very specific they liked about the experiment. There were no guidelines for this explanation/dialogue, for the students or for the visitors, so each dialogue was different and totally dependent on the interests of both parties.

This is interesting for the students in at least two ways: to add value to the experimental stages in which they are involved and, most importantly, to change roles, the students being the experts in the field who explain the light principle. There are also two interesting aspects for the visitors: seeing and learning about the experiments themselves and also seeing how the students have the ability to explain the experiments to them. In both cases, a dialogue is initiated between two apparently different fields (Art and Science) where light and experimental approach in the laboratory is the channel for this dialogue.

2.2. Upcoming stages

These visits are the first stage of different experiences that can be had in the Optical Laboratory. In the near future other complementary experiences will be able to be done, for example, these meetings in different formats (perhaps more expanded), or using any of the experimental stages for an art conference, or a common project (in Art and/or Science) that is born from these dialogues. On one hand, Physics students can improve their explanation skills and learning about the optical concepts they are working on. Also, with very specific experiments, they can have a more general overview of Physics around the world and in Art in particular. On the other hand, visitors can offer their knowledge of Optics in the Art context and improve their Physics knowledge for upcoming Art projects. This bidimensional dialogue improves the education of the students as well as the scope of Light's outreach, showing the importance of Light both in Optics as well as in Art.

In a more general approach, possibilities are infinite and all of the knowledge and experience resources that the Optics Laboratory can offer to different individuals cannot yet be imagined.

3. Conclusions

In this work we present the experience of local external contemporary art visitors to the Optics Laboratory, where the principles of Light and experimental knowledge were the main focus, as a very nice experience for students and also visitors, serving as a first step towards a base for an upcoming hybrid space of Science and Art in the Optics Laboratory.

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