

**Construction of an interactive space of life sciences: finding a way through the
difficult dialogue between scientists and artists**

Audrey Ivanenko Salgado[#], Adlane Vilas-Boas,
Camila Megale Leite, Andrea Haibara, Theo Mota,
Janice Henriques Silva, Juliana Carvalho Tavares,
Gleide Avelar, Mauricio Gino, Wallace Lages,
Francisco Marinho, Fabrício Fernandino and Pablo Gobira^{*}

Universidade Federal de Minas Gerais and

^{*}Universidade Estadual de Minas Gerais, Belo Horizonte, Brazil

[#] Corresponding author: ivanenko@icb.ufmg.br

Abstract

Open in 2013, the Interactive Space of Life Sciences is located in the city of Belo Horizonte, Minas Gerais, Brazil. Integrated to the Museum of Natural Sciences and Botanical Garden of the Universidade Federal de Minas Gerais, it represents an innovative environment where technology and art are combined with conventional education tools such as anatomical models of the human body and panels. The main idea is to mix the scientific content about the human body with the possibility of experimenting the biological functions in games and interactive activities specially developed locally. The team invited to develop the concept of the space included several university professors from different areas of the biological sciences and arts. In this work, we will discuss the difficulties found in the dialogue between scientists from the biological area and arts, who were engaged in the construction of games, videos and installations. The challenge for the biological sciences group was to transpose the scientific contents and concepts for the interactive environments into animated videos, games and interactions produced by faculty of visual arts and technology. The data

collected through interviews with the involved artists and scientists is presented in a juxtaposition to understand their different views on communicating science, in an attempt to contribute for future mediation in dialogues of this type.

Introduction

The growing need to train scientists to communicate effectively, especially with non-scientists, is a current trend. This work brought into contact teachers who do not normally interact with a common academic purpose, similar to what has been done in other academic situations (Multhaup, Denham, Kelly and Lom, 2011), namely, building the Interactive Space of Life Sciences (EICV).

The Interactive Space is composed of seven rooms dedicated to the human body, encompassing all human systems and one room for visually impaired visitors with models of cells, tissues and organs. The installations, videos, animations and games of the Interactive Space of Life Sciences were the result of a cooperation of professionals, including teachers (UFMG, UEMG, CEFET) of different knowledge areas: chemistry, biology, physical therapy, dentistry, engineering, fine arts, digital arts, animation film design, architecture, among others. Teachers from the Institute of Biological Sciences made the process of didactic transposition of science content and those from the School of Fine Arts were coordinators of teams of developers of interactive installations, including digital games and facilities.

Methodology

The data we present here were collected through a questionnaire with 10 open-ended questions to the art and science content teams, 5 and 8 people, respectively. The analysis attempted to find patterns of expectations and ideas inside each group and between the two groups. The questions were:

- 1 - What do you understand by interactivity when it comes to a space of science?
- 2 - What was your main role in the construction of the Interactive Space?
- 3 - When invited to participate in the construction of the Interactive Space, what did you think would be your greatest contribution?

4 - When invited to participate in the construction of the Interactive Space, what did you imagine would be your greatest difficulty?

5 – Was there any interaction between you and other participants from different areas? How often did this occur in terms of number of meetings?

6 - In your opinion what were the best contributions of the other team to execute your goal?

7 - In your opinion what were the greatest difficulty for implementing your goal?

8 - Would you participate again in a project to build an interactive space? If yes, what attitude /action from your side would occur differently?

9 - What attitude/action you wish was different about your partner (science content/art).

10 - Do you consider difficult the dialogue between the scientist and the artist?

Results

Since the idea of this science space was interaction, the first question addressed this concept. Although the scientist group tends to be more direct in the answers, there was a convergence with the ideas of the artists. The scientific content team tended to understand “interaction” as experimentation, playfulness and live experience, which is similar to "dialoguing with the installations or "to touch, manipulate, unchain actions" - sentences said by the artistic group. On the other hand, the content group showed concerns with the application of theoretical content and reflection on knowledge. As for the arts team, the responses show a more subjective nature, involving participation by the reaction of visitors, concern with the constant update of museum objects and also with the dynamics of the collection.

Asked to describe the function he/she performed on EICV, the content team indicated expectations on development projects, assistance to other teams, organization of specific content, care with the language and preposition of related items. It was noticed that this group understood that, beside the initial expectations, they could help in situations that go beyond the initially proposed function. On the other hand, the team of arts and entertainment described their actions objectively and limited referring to action and specific development practices associated with professional manner. For both, a concern was evident: to reach the goals and attract the target audience.

Early difficulties for implementation of the project were described by the content team such as those related to clarity of language, dialogue with the other teams or with the final product directed to the target audience. This clarity was necessary to actually be able to understand the technologies and integrate the specific content to the themes of the installations. As for the staff of arts, difficulties were related to deadlines, conciliation between theoretical content with playfulness.

It is noteworthy that both teams, in general, were concerned that the final product presented interactivity and also associated the science content in order to reach the public. If compared to difficulties encountered in the implementation of their proposals, both teams showed that the difficulties were operational and understanding between teams. They attributed these difficulties to inadequate number of meetings, be it within the own team or with the partner group.

Interestingly, in some reports we identified a clear demonstration of integration and cooperation between teams, leading to combined contributions of the content and of arts teams where creativity and interactivity were proposed by the science content team. These perceptions were corroborated in some answers: when asked to indicate the best contributions of the other team for the implementation of the goal, both indicated that it was an important opportunity for dialogue, exchange of information and knowledge.

The recognition of the roles played by each team within their specific areas of knowledge was notably demonstrated, and is illustrated in this answer: "The content team had the knowledge and the art team could materialize this knowledge in interactive works". Some pointed a need for greater contact between the specific teams and the team as a whole. The need to participate in the project from its conception was also indicated, thus demonstrating that the identification with the project should happen since the beginning of the project as well as the dialogue between the teams. It was also evident in the responses the need to expand the interaction, as well as the execution period so one can have appropriate meetings, projects, planning, and implementation. Often, the lack of time for physical meetings was partially resolved and supplemented by e-mails and other forms of interaction, but it was stressed out that meetings of specific groups with the coordinators of each team and particular meetings between the specific teams were fundamental to the development of projects.

Finally, when asked about a difficulty in the dialogue between scientists and artists, the responses were split between "yes" and "no", within and between groups. For those who answered yes: "Dialogue is difficult given the difference between the areas of competence of the professionals involved, either in the aspect of methodology, language, values or actions". One affirmation illustrating those who said no: "The dialogue is not difficult when people are open to it; there is growth throughout the work with enrichment for the group".

Final Thoughts

The Interactive Space of Life Sciences is a space for the dissemination of scientific concepts and can become an important support for teaching activities, from elementary school up to higher education, since it uses technology language coupled with scientific concepts, in a participatory, accessible and fun way.

We tried to reflect on language and the ultimate goal, and especially for what and for whom it will serve. The playful and fun aspect was an instrument used to provide concrete relationships between the contents and the reality of the visitors. The use of technology be it in video games or interactions and generated a new language that synthesized scientific knowledge with the aim to attract and stimulate the curiosity of the public.

We understand that, sometimes, scientific language can be a barrier to learning. We also understand that in order to provide or enhance learning, it is necessary to combine perception and affection to the concept. Our strategy was to switch between natural language, the language of games, interactivity, installation, video, 3D visions to lure visitors and convey conceptual contents. This new language provides a new relationship, creates a new pedagogy of museum spaces, because the interactivity gives the possibility of user participation, and in tune with the pedagogical concept of learning by doing, taking the user to an active role in shaping their particular knowledge.

Care, starting with the choice of languages, the degree of challenge posed in the games and not misrepresentation of content through interactivity itself should be taken. The dosage is important because in some situations it can draw away a visitor, be that for the degree of difficulty of the game itself, either by ignorance or unfamiliarity with the technology used. Communication and interactive dialogue will only be valid to the extent

that it expands the understanding of phenomena and enable a conceptual gain. Hence the importance of multidisciplinary teams who worked to build the Interactive Space of Life Sciences.

To achieve the goal of dialogue with the public, the teams had to talk over the project development. The results of the questionnaire showed that this dialogue should be widely sought through meetings since the beginning of the project, since the most primordial conception till the project completion. The exposure of the needs of each team should be favored in an environment of freedom that contributed to the full partnership among the teams involved, resulting in truly collective construction of EICV. As one of the participants affirmed, the teams completed each other, indicating that the work could have not been built without the participation and exchange of knowledge and information from different professionals. The dialogue is difficult, but necessary, and should be encouraged and promoted.

Our group was composed of faculty from different areas: arts and biological sciences. In a work by neuroscientists a question was addressed whether creativity in the arts and sciences is based on similar or different characteristics of mental processes; if different, what are these differences (Andreasen and Ramchandram, 2012). They demonstrated that the process of information occurs in a similar way, since the very talented artists and scientists show similar patterns of activation in several regions of the association cortex. The artist must know the theme which his work will perpetuate, as the academic teacher, stuck in the classroom can exercise their creativity in partnership with art.

Our group has shown that it is possible to treat an academic subject with the language of non-formal education, translated into animated videos and interactive games, which were already demonstrated by Diucênio Rangel, (2005), who showed that it is possible to make the content into images and action seeking to lure the visitor to science.

This is because science centers and museums serve as a potential scenario where science and society can meet and talk. Before that, teachers, scientists and researchers gathered to propose this scenario initiating the dialogue, where scientific communication based on dialogue resulted in benefit to citizens. Come into action in this process there were researchers, artists, teachers, general public, students, and others concerned with content,

art and interactivity to achieve the goal, which was to communicate, interact and entertain with quality and academic knowledge.

Thus, the importance of proper communication, shared knowledge and the need to engage all actors in a dialogue at all stages of this process were indispensable and necessary factors, supporting the study by Svalastog, Allgaier, Martinelli and Gajovic, (2014). These authors state that to succeed, special attention should be given by all actors to be involved in the dialogue. This should facilitate the flow and exchange of knowledge and its use for the benefit of society in general.

References

Diucênio Rangel. (2005), O diálogo entre ciência e arte Cienc. Cult..57(4) pp

Nancy C. Andreasen,; Kanchna Ramchandran (2014), Creativity in art and science: are there two cultures? Dialogues Clin, Neurosci. 14(1) pp 49-54.

Anna Lydia Svalastog, Joachim Allgaier, Lucia Martinelli, Srecko Gajovic (2014) Distortion, confusion, and impasses: could a public dialogue within Knowledge Landscapes contribute to better communication and understanding of innovative knowledge? Croat Med J. 2014 February; 55(1): 54–60.

Kristi S. Multhaup, Scott Denham, Hilton Kelly, Barbara Lom. A Mechanism for Multidisciplinary Dialogue: The *Memory & ...* Series. J Undergrad Neurosci Educ. 2011 Fall; 10(1): A9 A13.