Next-to-planetarium exhibition's educational use

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BIOGRAPHY
Manager of European Space Education Resource Office (ESERO) in Poland. Apart from the educational aims, he is a planetary geologist with an interest in small Solar System bodies’ dynamics. During university studies, he participated in student Martian rover challenge. Experience gained is now used for the organization of Cansat competition in Poland.

ABSTRACT
Approach to the idea of educational activity introduction in the proximity of the planetarium dome is being discussed. Paper illustrates a decision-making process, leading to the development of the final educational activity, its grounds, reasons for reiterations, and outcomes. It might be a useful case to be considered when planning to pursue a similar goal – which in this case was to increase visitors’ interest in the exhibition established around the planetarium dome.

INTRODUCTION
Copernicus Science Centre (CSC) has a planetarium dome, Heavens of Copernicus, which is spatially dispatched from the main exhibitions. This can cause a situation when the visitor base is different for Planetarium and the Science Centre. Therefore, when visitors are coming to the Planetarium, it might not be obvious to them how to find themselves among the exhibition content.

Exhibition which surrounds the planetarium dome is named ‘Look: Earth!’ and is mostly concerned with astronautics, rather than astronomy. The overall theme of the exhibition is space exploration and space research, including how they affect our day-to-day lives. The experience starts down on Earth, as you manage your own rocket launch. There are opportunities to enjoy the view from a space station in real time, to examine real satellite photos, to learn about the number, speed, and altitude of the satellites circling the planet, and also to find out why they do not fall down to Earth, and so on. It contains 20 interactive exhibits and numerous models, photographs, and dispersed content. Due to the effect that visitors are mostly interested in the planetarium screenings, exhibition experience surges in visitor count, right before the screenings. In other times, it is not very crowded as it is mostly regarded as a ‘waiting room’ rather than the point of interest in itself. This situation has been identified as a starting point for a change in school groups’ visitor experience.
I. TAILORING THE ACTIVITY

1.1 Understanding the baseline
Heavens of Copernicus is a great prospering planetarium, which attracts about 230 000 visitors a year, produces award-winning movies and organizes a lot of special events gathering large number of interested people. Nevertheless, dome lives its own life, and the exhibition around it – its own. Our entry point was the realization that people attending planetarium activities rarely interact with the exhibits more than to just pass time (which was the purpose of the exhibition in the first place, but after several years, a window for another way of utilization has opened). Even more, school groups visiting planetarium for the screenings and regular CSC exhibitions, rarely used Look: Earth! Exhibition actively and with enough time to develop mental constructs connected with concepts visualized by the exhibits there.

1.2 Setting the goal
There were several aims that were identified as worth pursuing at the beginning of the planning process. We wanted to increase the number of visitors that actively interact with the exhibition, with as much educational gain as they can get from its constituents. This active participation could be managed through organized workshops which would fit into the CSC’s commercial offer and therefore stand as extra budget influx.

From the beginning, we have wanted to develop resource in dual form – not only the paid version, but also to release an open access scenario of exhibition use for the teachers, with listed curricular link of the exhibits, which prove helpful when planning one’s lesson (in this case, well outside the classroom).

1.3 First iteration
In the first place, we wanted to introduce a product, which would offer groups of our visitors an active yet guided way to get familiar with the ideas presented by the exhibition’s content. The idea for the workshop – called Space Lesson – has been to provide meaningful 1.5 h activity for a school group of lower secondary students.

Activity focuses on the student exploration of exhibits and concepts presented by the exhibition, however, it start with an mini-lecture on one of subjects (i.e. electromagnetic spectrum, light pollution, data transmission, etc.), selected from the list by the explainer carrying out the workshop. Then, participants are divided into groups, which are given a task of finding any information they can spot on one of the themes (weather prediction, Earth observation, Space in art & pop culture, etc.). Every group gets one, separate theme. Explainers are ready to help students when they encounter any problems. Students take notes on the Activity Cards they are given at the beginning of the workshop. After some time, students are gathered in one place in the exhibition area (preliminary choices are presented in Fig. 2), and discuss in their groups, what they have experienced in relation to their assigned themes. Afterwards, explainer asks every group to present their gathered information using flipchart, to the rest of the class. As all of them complete their presentations, discussion begins on different points of view from which students has been looking at the exhibition and space in general.

During this kind of workshop, students not only gained knowledge independently, while discovering the phenomena presented by interactive exhibits, but also develop soft skills needed to discuss their ideas and then present their own observation before the class.

Figure 2 – Spaces considered to harbor workshop activities
The formula for the workshop has been tested during the “Space at School 2017” teacher conference. We invited participants to take part in the pilot version of the workshop. We gathered 25 willing teachers, who filled the places which would normally belong to the students. This experience gave us a lot of feedback from the very people who would use the visit in CSC/Planetarium for the educational purposes. This part is an important barometer to check if the designer’s idea is overlapping with the user’s reception of the activity that is being developed.

In this point in time, idea for the workshop introduction has been to sell it as a product merged with a planetarium screening. Therefore, we set the times of the workshops to be carried out in the 1.5-hour intervals before the targeted screening, to allow school group to see the movie right after they end their workshop. At this stage it turned out that planetarium, seat-oriented, ticket system is poorly compatible with strict-count group additions to its sales operation. Therefore we have abandoned the idea of the merged workshop-screening ticket for school groups.

I.3.1 Cooperation between departments
This part of the process might only translate to rather large organizations. CSC employs about 300 people, and therefore its organizational structure can be challenging at times. In designing of the educational activity in the exhibition space, ESERO-Poland, which is a part of the Educational Lab, had to consult several specialists devoted to work in different departments of the organization. Below, specific tasks are listed, which needed to be carried out with help of employees from mentioned departments (marked with black circles on Fig. 3):

- Education Lab: Development of educational content for school groups,
- Planetarium Department: Connection of current planetarium cinematic content to the exhibits,
- Tickets and Information Department: Designing the screening-workshop-exhibits ticket interconnection,
- IT Department: Implementation of new product into the ticket sale system,
- Marketing and Sales Department: Calculation of the activity affordability,
- Operation Department: Involvement of explainers, exhibition area use for regular dates,
- PR Department: Promotion strategy for the activity.

![CSC organizational structure](image)

Each of these interactions caused the proto-activity to evolve, and to adapt to organizations capabilities and needs, and therefore were crucial to the development process. It illustrates the need to reach for people of different background in the organization to possibly improve the output of one’s work in development of new kinds of activities.
1.4 Second iteration

After the shift in direction, caused by the ticketing inconvenience in case of workshop-screening merging, workshops were to be a separate product, being sold like other extra-activities in CSC, i.e. lab activities, thematic evening for adults, etc. Pilot version of the workshop was to be carried out 3 times a week for the most of the 2018 year, to evaluate its impacts and cost return in that timescale.

At this stage, activity was evaluated by the CSC Programme Committee, to see how its gains and costs balance each other institution-wise. To perform this evaluation, several scenarios were considered to have a wider view at the economic perspective of the product.

Important thing while performing calculations was to include all the work hours of people involved in the process of developing and managing the process of workshop introduction (these of continuous involvement in the activity, but also these who participate only at the beginning of the process). Another estimate to make was to include the exploitation of inventory like: flipchart holder, print-outs, markers, etc. These are presented as an example in Table 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Gross cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario development</td>
<td>€ 690</td>
</tr>
<tr>
<td>Exploitation inventory (for one year)</td>
<td>€ 366</td>
</tr>
<tr>
<td>One-time worktime</td>
<td>€ 1 100</td>
</tr>
<tr>
<td>Continuous worktime (for one year)</td>
<td>€ 2 243</td>
</tr>
<tr>
<td>Sum</td>
<td>€ 4 399</td>
</tr>
</tbody>
</table>

Table 1 – Summary of cost estimates

After gathering the sum cost of the activity, it could be considered in light of specific number of workshops being carried out in said time, with particular come up (not every instance would be sold out possibly) and several levels of commission being imposed (Table 2).

<table>
<thead>
<tr>
<th>Annual frequency</th>
<th>Annual income</th>
<th>Annual profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>Resultant vis</td>
<td>20% commission</td>
</tr>
<tr>
<td>100%</td>
<td>2100</td>
<td>€ 4 540</td>
</tr>
<tr>
<td>80%</td>
<td>1680</td>
<td>€ 3 632</td>
</tr>
<tr>
<td>65%</td>
<td>1365</td>
<td>€ 2 951</td>
</tr>
<tr>
<td>50%</td>
<td>1050</td>
<td>€ 2 270</td>
</tr>
</tbody>
</table>

Table 2 – Profitability estimation based on visitor come up and commission levels

Above mentioned calculations were the base to the conclusion, that even though workshops would generate some profit, it was a far too low financial incentive to introduce the product to the customers/visitors.

1.5 Final iteration

After considering the economic calculation and abandoning the idea of commercialization of workshops, the idea of open access, downloadable resource for the teachers came to the forefront.

Basic idea of supplying teachers with guidelines how to use exhibits to discuss curricular topics, has been already developed at this stage. With the scenario of explainer-run workshop, work has been shifted to adapt it to be used by teacher guiding his/her class. This meant the exclusion of use of CSC inventory, like flipchart holder, and begged for much thorough explanations for the teacher, who do not have to be specialist in some issues being discussed in resource introduction segment.

Polish version of the final resource (Fig. 4) is available here: [http://esero.kopernik.org.pl/warsztat/kosmiczna-lekcja-esero/](http://esero.kopernik.org.pl/warsztat/kosmiczna-lekcja-esero/)

Resource has been published on CSC website, and can be downloaded by teachers interested in carrying out the lesson themselves, when they come to the planetarium with their students. As for now, download counter is showing 55 downloads, in the period of less than 3 months. This count is not disappointing, as it is rather niche among teachers to feel enough confident in unfamiliar environment to carry on with the lesson. Therefore, we feel that the final resource is deemed useful by the target audience.
II. CONCLUSIONS

Whole path of activity/resource development has been covered – from the analysis of the problem to be addressed, through several iterations of the solution, to the final one, which does not have to be very similar to the first, prototype one. This case shows that sometimes, while developing new resources or activities, we should look at the wider picture – be it a perspective of our institution, or of the visiting people. The final product presents rather uncommon way to involve teachers in the science centre or planetarium spaces – as a substitute for an explainer figure. This substitution is important for the activity impact, as it has the potential to temporary transform the relation expert-student into a tutor-student, which gives students much more creative interest in the surrounding, which in this case is the exhibition around the planetarium dome.

ACKNOWLEDGMENTS

Resources being discussed were developed by the ESERO-Poland office. ESERO-Poland programme is an European Space Agency educational programme being carried out in Poland by Copernicus Science Centre.