The NOVA mobile planetarium in the COVID-19 era

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Abstract. NOVA coordinates a group of three inflatable mobile planetariums which visit around 200 primary and secondary schools per year (~30,000 students/year). After an initial stop in activities (March-June 2020) due to the COVID-19 crisis, NOVA has invested in a high quality flat-screen in order to continue planetarium operations safely during the pandemic. The same interactive shows are given in a large, darkened room with students sitting on cushions in a close group (current Dutch regulations allow close contact between children under the age of 18). A test of the 'COVID-19-safe' mobile planetarium at a summer school for primary school children (ages 7-11; 180 students; 20 teachers) was highly successful. The evaluation showed that all participants found the experience to be highly inspirational. The expert presenters felt that the set-up with the flat-screen enhanced the interaction between the presenter and the students.

Background

The Netherlands Research School for Astronomy (NOVA) operates three mobile planetariums running Evans & Sutherland Digistar 6 software with a customised dashboard. The NOVA mobile planetariums visit around 200 schools per year (primary & secondary), reaching approximately 30,000 students and 1000 teachers annually. The NOVA inflatable domes have an internal diameter of 5.5 metres and are therefore large enough to accommodate a single school class (maximum 30 students) per show. The planetarium shows are led by an expert, typically a later-years bachelor or master student in astronomy, and are highly interactive. There is no set programme and after a short introduction, the show is led by the interests and questions of the students.

Whilst research shows that the use of a dome brings unique learning enhancements – e.g. the immersive experience improves a student's ability to retain information (Zimmerman et al., 2014) and a three-dimensional space is effective in teaching three-dimensional concepts (Sumners et al., 2008; Plummer, 2009) - NOVA has looked to alternative solutions for the COVID-19 period. The useful article of Reiff (2020) published on the IPS website calculates reduced capacities per show and alternative configurations for the continued use of a dome in the COVID-19 era. However, in the Netherlands, the time and monetary costs incurred by such a drastic alteration in the numbers of students able to attend a single interactive lesson makes such an approach unattainable. NOVA has therefore developed an alternative approach using a high quality flat-screen. In this article we describe the NOVA COVID-19 solution and present initial feedback from a test school and the experts giving the shows.

The NOVA flat-screen solution

NOVA has invested in a high quality flat-screen (Figure 1). The full screen measures 1.7m x 1.7m with a projection area of 1.6m x 1.0m and is light-proof – no light is transmitted through the screen. Projection is with the same high-power projector used within the inflatable dome. A flat-projection lens is used rather than the fish-eye lens used in the dome. The room in which the screen is used

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needs to be reasonably well darkened but does not need to be fully blacked-out due to the high intensity of the projector (6500 lumens).

The NOVA mobile planetarium uses Digistar-6 software with a customised dashboard and set of routines for ease of use. The customised routines have been modified to enable projection onto a flat-screen.

In order to recreate, as much as possible, the atmosphere within the dome, students still sit on cushions on the floor close to the screen rather than on chairs in a traditional classroom configuration. The expert presenter sits next to the screen on one side facing the students for maximum interaction.

Figure 1 The NOVA flat-screen planetarium.

The current COVID-19 situation in the Netherlands

Correct at the time of writing (August 2020)

As of 1st July 2020, primary school students (under 13 years old) in the Netherlands are no longer required to socially distance, either amongst themselves or from adults. Older students (13-17 years old) are also not required to socially distance amongst themselves but do need to remain a minimum of 1.5 metres from all adults. All adults (18+) are required to keep a minimum of 1.5 metres from each other. At the time of writing, there is no requirement for any age group to wear masks in the school setting.

Whilst the new COVID-19 rules (as of July 2020) could allow for the use of the inflatable dome in primary schools, NOVA has taken the decision that, for now, the flat-screen option is still preferable for safety reasons. The flat-screen is the only possible mode of operation in secondary schools at the time of writing.

Test of the NOVA flat-screen solution at a summer school for primary school students

In July 2020 the NOVA flat-screen planetarium was tested at a summer school for primary school students in the Amsterdam area. Six interactive shows were given, each lasting approximately 45 minutes. The ages of the students were 7-11 years old. In total around 180 students and 20 teachers attended the shows.

The flat-screen was positioned in the school gymnasium. The room was chosen for its size (larger areas are considered safer for groups at the current time). The lighting was disabled and windows were taped off to increase the level of darkness. The expert presenter was seated next to the screen, positioned to face the audience whist also being able to view the screen (Figure 2). The students sat close together on cushions on the floor, the front row being just 50cm from the screen. The teachers sat at the back of the group on chairs, more than 1.5m away from each other and the presenter. The intimate seating set-up is possible with primary school aged students due to the current regulations in the Netherlands (see above).

Figure 2 Testing the NOVA flat-screen planetarium at a summer school for primary school students, July 2020.

Aside from the difference in set-up, the interactive shows were given in the same way as in the dome in pre-COVID-19 times. The expert presenter starts the show during the day at the location of the school and scrolls to nighttime. The students are actively encouraged to ask questions and give suggestions of what they would like to see and learn.

The experience of the NOVA mobile planetarium staff

Four NOVA mobile planetarium staff attended the test day and shows were given alternately by two presenters. Before the test day, all staff had reservations about whether the COVID-19-safe (flat-screen) version of the planetarium would live up to the experiences in the dome.

All NOVA planetarium staff felt that the test day went far better than they had expected. Specific quotes include:

> '*The room was dark enough and the setting is intimate with the children sat close by on the cushions. In this way, the experience comes very close to that within the dome.'*
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> *'The dome experience is unique, and that's difficult to replicate, but the new set-up has other advantages. The presenter has a better overview of the class and as such, it's easier to make contact with the children and ensure everyone gets a chance to contribute to the discussion and ask a question. In the dome this isn't as easy as there are always children sitting behind the presenter.'*
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> *'The projector-lens-screen configuration actually gives a sharper image on the screen so some details are easier to see on the flat-screen.'*

In summary, in 'normal times' the dome will still be the operation mode of preference, but all NOVA staff felt that with the flat-screen solution, it is still possible to provide an inspiring experience during the COVID-19 crisis.

The experience of the summer school teachers

In addition to the internal evaluation of the flat-screen, NOVA asked for feedback from the summer school. Quotes from the teachers include:

> '*The presenters did a great job. They posed thought provoking questions to the group to stimulate the interaction and the focus of the show stemmed from the interests and questions of the children. As such, each show was different.'*
>
> *'The room was dark, the images good and the children sat in a close group on cushions on the floor, close to the screen and the presenter. This was a unique experience and certainly not a normal lesson!'*
>
> *'A super cool experience. Every school should have a planetarium day!'*
>
> *'The flat-screen, set-up as it was, was definitely not less inspirational than a show in the dome.'*

NOVA mobile planetarium bookings in the COVID-19 period

NOVA mobile planetarium shows were cancelled for the period March-June 2020 inclusive. Schools were quickly informed of the new flat-screen version of the planetarium which was available from July 2020. A more general announcement will also be released in the annual flyer distributed to schools in September 2020. Whilst the bookings are not yet up to pre-COVID-19 levels, there is significant interest from schools with many reservations for the flat-screen version of the planetarium already in place for the new school year, starting in late August 2020.

Conclusions

Whilst the default operational mode of the NOVA mobile planetarium will continue to be the use of the inflatable dome, during the COVID-19 crisis, the flat-screen projection mode provides a safe yet still inspiring experience. The flat-screen approach allows NOVA to continue to reach primary and secondary school students across the Netherlands during this challenging time. Schools across the country are keen to try out the new flat-screen version of the planetarium and whilst bookings are not yet back to pre-COVID-19 levels, many bookings for the new school year are already in place.

References

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