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The inmate sky Astronomy in a juvenile detention institute

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Abstract. We here present the general outline of the project "Open up, Sky!", a pilot project of astronomy education in a Juvenile detention institution in Sardinia, Italy. The project is still in progress, and we report here the first preliminary results.

Keywords. inclusion, astronomy literacy, prison, astronomy education

1. Astronomy inside detention institutes

Talking about astronomy inside a jail could be perceived as a bit paradoxical. For most people the word astronomy evokes first of all images of open dark sky, perfect infinite space and beauty and probably the idea of an ultimate freedom. It could be not easy to talk about astronomy to people who live a distressing situation, locked in a confined space, deprived – for a short or long period – of their own freedom. So does it make sense to do an astronomy educational project for inmates?

Let us take a step back. Is it important to do STEM education in jail? The word "education" comes from the latin word e-duco, which means *lead out*. What are we supposed to lead out with the education? The answer is quite easy: compentences, soft skills, principles, values, rules of behaviour, valid for daily life, not only within the detention institution, but in the external world where the inmates will come back, once the sentence is over. In a broader sense, educating in prison means educating to freedom: to live in a profitable way for oneself and for others, to take responsibility for their own choices, and so, definitely, to grow. Educating through astronomy, in particular, means using the sky as something that brings back to elementary, primary experience for all. It often represent a place with which you have an affective relationship (let us think, for example, to our emotivional relationship with the moon), and leads us to reflect on transversal themes. And this is perfectly in agreement with the meaning of the IAU tag *#astronomyforabetterworld*.

Unfortunately, at least in Italy, STEM education inside jails and juvenile detention institutes seems not very common. From a recent survey Report Antigone (2017), it comes out that only a very small percentage of educational activities are dedicated to science: among these, most activities regard to basic computer science and robotics, little physics, poor astronomy. Among these very few experiences, the Italian National Institute for Astrophysics (INAF) for about ten years proposed some pilot outreach projects, such as the astronomy session of the "Free to read" project in Bologna Pratello juvenile detention institute (2011), or the astronomy discussion with Samantha Cristoforetti inside the Beccaria jail in Milan in the framenwork of the "Close encounters" project (2015), where the parallelism between the life of reclusion in jail and in space station has been profitably

used. More recently, we inaugurated the Italian tour of the Inspiring Stars exhibition (https://sites.google.com/oao.iau.org/inspiringstars) at the Rebibbia Jail in Roma and signed a formal agreement with the Tuscany Regional Penitentiary Administration for a series of astronomy seminars. All these projects had a great success and aroused a lot of interest and participation by detaines. Using these encouraging premises, we hence decided to propose a more structured educational project to the Sardinia Center of Juvenile Justice.

2. Project Overview and Implementation

After a lot of preliminary meetings, in February 2020 we signed a formal agreement between our Insitute and the Sardinia Center for Juvenile Justice for the implementation of the project *Open Up, Sky!*, an astronomy education project, whose general lines and specific methodology have been designed in agreement between INAF staff and Quartucciu Juvenile Detention Institute educators. In particular, we adopted EBL (Enquiry-based Learning) and PBL (Project-based learning) approaches, following constructivist and constructionism principles, favoring a learner centered and collaborative approach. We also selected a list of possible contents, ranging from light properties to universe phenomenology to space science to astrobiology. Attendance of meetings has been fixed once a week, in the afternoon, outside the common school activities, on a voluntary basis. We also decided not to fix the activities program order, preferring to follow the particular interests of the young detained.

The project was supposed to start in March 2020, but has been stopped due to the pandemia. We discussed about the possibility to start anyway with on-line meetings, but, since one of the key points of the project is the establishment of a direct relationship between inmates and tutors, we agreed that the physical presence of the astronomers was essential. So we started on August 2020. At the present moment, 18 meetings have been held in presence, involving 12 young and 3 internal educators in total.

During the meetings we use different educational tools:

• **hands-on activities**. We follow the educational constructivist and constructionism principles of "learning by doing": instead of simply listening to an astronomy lecture, we foster the engagement with the subject matter to solve a problem or create something. We hence use hands-on activities to introduce astronomy objects and phenomena.

• **story-telling**. We introduce almost all meetings with several narrative elements: tales of scientist biographies (Galileo, Newton, Edison, Maxwell, Curie, Bell Burnell,...), stories of particular discovery achievement, history of space conquest, etc, to tickle the imagination and promote the creation of a emotional link with inmates lives and experiences;

• **tinkering** The tinkering approach is characterized by a playful, experimental, iterative style of engagement, in which makers are continually reassessing their goals, exploring new paths, and imagining new possibility (Resnick & Rosenbaum 2013). We propose several tinkering activities (scribbling machines, circuit boards, chain reactions) to introduce research methods and processes;

• **coding bases** In order to promote computational thinking formation or empowerment, we introduce the basic principles of coding with unplugged activities and the offline version of Scratch.

We also succeeded in organising a star gazing event, inside the jail court and with all the obvious limitations due to artificial security lights. During the event, inmates and prison guards took the opportunity to familiarize with a small telescope and to observe Saturn and Jupiter. Another event is scheduled to observe the Moon. Unfortunately, for security and privacy problems, we do not have pictures of the various activities done till now. We just obtained to take some pictures, checked and approved by the institution

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Figure 1. Left: a moment of the stargazing event. For all the inmates it was the first time they approach to a telescope, and for most of them the first time they really watch the sky. And they were completely excited by this. **Right**: The scribbling machines activity. They spent almost two hours totally committed to the activity: they had a lot of fun and created wonderful and very creative objects!

responsibles, only in particular moments. In Fig. 1 we show the approved ones, relative to the stargazing event and the scribbling machine tinkering activity.

3. Preliminary results

As previously said, the project is still on going. Anyway, we can summarize here some of the faced difficulties, the initial learned lessons and some outcomes.

General and specific difficulties.
Participants The involved inmates represent a very heterogeneous target: they come from different nations (Senegal, Bosnia, Romania, Egipt, Tunisia, Italy) and have hence different social, school level and religious background. Moreover, they are of different ages (the youngest being 16 years old, the oldest 23) and present different committed crimes and distressing past experiences. Again, some young went out from the juvenile detention institution during the project, because of transfer procedures or changes in sentence application, causing some educational discontinuities.
Physical limitations Inside a jail there is a general lack of real autonomy, and, in addition, we cannot use freely any kind of materials (scissors, cutter, ...) and tools (no connection). Moreover, most of them are not allowed to leave the institute even for a couple of hours, so we could not let them visit our observatory/planetarium. The practical organization of the star gazing event itself took a long time and a number of authorizations.
Attitude Even if the participation to the project is voluntary, some of the young experienced (or pretende to show) an initial mistrust and/or indifference to the project. Of course, they could be limitated by the fear of judgment and by the lack on knowledge of different life styles. So it took time to establish an emotional educational relationship with them. Again, their psychological state is very unstable, and even the most motivated sometimes failed to join the activity. At the same time, it is not easy to be involved in their lives and stories without risking being emotionally overwhelmed.
To face all these problems, we benefit of the presence of almost one educator of the Institute during all the project meetings and of the professional advice of a psychotherapist during all the project phases.

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Figure 2. The Open Up, Sky! project logo, designed by Laura Barbalini (INAF-OA Brera).

Lessons learned. As a general vision, we promote the use of Astrophysics and Space Sciences to encourage and support the self-determination and self-expression of the individual, regardless of gender, social status and culture of origin. And, of course, of committed crime. So a project inside a juvenile detention institute was perfectly matching this thought, and, even if it is very complicated enter inside prisons, it is very important – we would say, fundamental – to talk about astronomy to detained people. Even a hour-long meeting could be useful for prison inmates but, when possible, try to develop a longer project based on active participation.

Again, it is important to be organized but flexible. You should have in mind very structured and well designed plans, but it is more important to be able to follow the young interests and to change plans at the very last moment.

Moreover, it is extremely important to be very patient: even if they seem to not listen, do not panic! Often they are only pretending, because they do not know how to "play" with you. You should remember that most of them did not have a proper childhood and adolescence, but they always have inside a child spirit to talk with. Indeed, we obtained the most important engagement with "playing" activities such as tinkering, unplugged coding, rocket constructions.

Unfortunately, we could not yet perform a proper evaluation of the project and its outcomes. But some initial indications seem very positive and encouraging. First of all, the level of attention of the involved young is increasing meeting by meeting. Their participation is more active, and now we can have real discussions about some scientifical issues. Moreover, one of the young started a school program with very good grades.

In conclusion, we started this project with the idea to open some new horizons to young people confined in a closed world. By providing new points of view and new perspectives for involvement and participation in culture and knowledge formation processes, our initial aim was to to help people to find and maintain an inner way to have complete control over their own decisions and their own lives. We still do not know if we succeded in this, but it is worth it because, as Paul Freire said, *"education is freedom"*. And the truth is that we learned more that we tried to teach.

4. Ackowledgments

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