

Astronomy as entrance to STEAM capacity building

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The reasons that make astronomy appealing to all are precisely the ones that make astronomy a good entrance to Science Technology Engineering Arts Mathematics (STEAM) education. Astronomy is universal and inspirational, relates to all sciences, pushes technology forward, and invites people to reflect. Those reasons are woven to construct the goals of learning STEAM via astronomy, which are: To raise awareness and comprehension of the physical world and natural causal relation; To promote rational perception and respect towards abiotic and biotic environments, including human being; To promote curiosity, knowledge, skill, creativity in STEAM; and To promote positive participation and mindfulness. Those four goals resemble and emphasize the key spirit of the Sustainable Development Goals.

We apply this approach in an area surrounding the site for a new astronomical observatory in Timor island, Indonesia. The sky quality is excellent, yet the national development is still far behind, with minimal infrastructure and very low living condition. The challenge is to ensure the coexistence of a modern observatory and thriving villages. We ask ourselves how astronomy, with its high STEM level, assists a community to develop. The key is to find a common ground for the observatory and villages to grow together and be clear about what each aspires to be and the requirement for success. STEAM has the following elements in its embodiment of knowledge and skill learning: empowering rational thinking, encouraging life-long learning, expanding horizons, promoting creativity, and fostering teamwork. For an observatory to optimally function and produce high quality science in a region shared with a community eager to move forward, it must have a clear goal and strategy that embody sustainable development ideas. To engage and to empower rational thinking it is mandatory that we first learn and acknowledge the existing way of life and relation with the nature. This is important to understand the local mindset and identify obstacles in the logic that could hinder development. Then we together identify the challenges and construct a roadmap towards the future. Astronomy comes in from a wider perspective and then zooms in towards some chosen STE(A)M challenge. Since electricity and clean water are not yet available, they are the centre topic. Most astronomy material to be introduced eventually lead to water and energy, and are prepared according to learners' cognitive level. Deliverable topics are: Earth and the Universe, Living on Earth, Water, Energy, Human and STEM, and Good data. The strategy for proper deliverance is by building teamwork, optimizing communication, and using training and as empowerment modes.

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