

## Communicating Astronomy: Knowing Your Audience

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**Abstract.** Science communication practitioners are always looking for better ways to engage their public. This is the case for astronomy communicators, a community of practice that is interested in engaging with those who are traditionally out of the science radar, including the less privileged ones. One of the major challenges astronomy communicators face when addressing the public is related to knowing what their interests are, whether they have and which are their misconceptions and ideas about astronomy, if any. Building strategies to know one's audience may be decisive for the success of an astronomy communication practice, both in formal and informal settings. In this article, we present some of the challenges practitioners may face when communicating astronomy to today's audiences and suggest approaches to address them.

### 1. Introduction

Science and Technology (S&T) are the basis for multiple individual and collective decisions about issues such as health, climate change and food safety [1]. In this regard, the public is expected to understand S&T topics, not only as a mere recipient of knowledge but also to be in a position to engage in dialogue and decision-making processes with social impact [2]. The growing focus on dialogue and open participation calls for a better understanding of the ways the public appropriates scientific knowledge (in a dynamic and concrete situation). Therefore, communicating science to, with and for the public implies not only for communicators to develop specific skills to engage and communicate effectively in a multicultural environment, but also to know and understand their audience's norms, values, expectations, and conventions [3] related to S&T.

We acknowledged at least three factors that result in a variety of audiences, in number and type, and pose several challenges for the practice of communicating astronomy in an ever-changing world: (a) the recognition that astronomy is an attractive science to trigger interest in STEM (Science, Technology, Engineering and Mathematics) subjects [4]; (b) the exposure that astronomy's breakthroughs benefit from in media channels; and (c) the growing focus on participation. Recent research has been showing that (at least in the

western world), there is low engagement in STEM subjects, with significant differences between gender, ethnicity and cultural capital [5]. In that respect, astronomy faces its own trials, as, according to recent data from IAU (International Astronomical Union), women represent 17% of the membership of professional astronomers and people from developing countries are far from participating fully in astronomy research [6][7]. Data suggest a low level of science literacy in specific social groups, despite the high interest and the public's curiosity [8]. This calls for research to continue examining the science-public relationship.

### 2. Communicating astronomy: practice & research

If we want to answer the question "how does the public understand and engage with astronomy?", we argue that we need to consider three main factors: a) processes of knowledge production; b) learning processes; and c) science communication research looking at how people experience science in their lives and how scientific achievements are embedded in social relations. These aspects seem to indicate the need to develop interdisciplinary studies of science audiences.

The first factor implies recognizing that knowledge production is a process and that a scientific breakthrough depends on several decisions (for instance, choosing the topic of research, the theoretical frameworks, the funding program, etc. may interfere with the knowledge production). Sharing those decisions with the public and speaking openly about them would enhance transparency and, in some cases at least, may benefit communication processes and increase public trust [9]. With regards to learning processes, we advocate drawing on advances in science education and psychology of education [10], which have been contributing toward enriching traditional educational practices in astronomy. Finally, paying more attention to science

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communication involves recognizing the importance of communication as the interface between science and society [11].

### 3. Tips to engage your audience

Any communication involving the public is complex and contextual, and astronomy is no exception. As suggested above, paying more attention to science communication research may reveal important aspects about the public and its relationship with science. Existing studies on learning and communication processes of science-related topics have already led to important findings. In the following textbox, we present seven practical recommendations [12][13][14] that may be useful for astronomy communication practices. Research shows that people seek relevance in their understanding of science [12]. It also shows that, despite the fact that not everyone is interested in science and in a “clean” factual approach, most people are interested in stories

#### Recommendations for astronomy communicators

1. keep the language as straightforward as possible; 2. think about the possibility of alternative conceptions; 3. concentrate on finding good introductory “hooks,” if possible using the “human factor”; 4. give audience a role in your practice (making them have an experience); 5. use different modes of meaning (such as visual, tactile, digital, linguistic, etc.); 6. be creative and inclusive; 7. keep it at the right level for your audience! [12][13][14]

about people (“the human factor”) [14], as well as their discoveries and adventures, and this may be useful when communicating astronomy. One of the most difficult challenges science communicators face includes misconceptions and preconceptions regarding science-related terms [12]. This becomes a bigger issue when we face audiences that are quite diverse, with disabilities, different economic backgrounds, ethnicities and genders.

### 4. Conclusions

In order to understand how the public engages with the science of astronomy, we need to develop our understanding of how people appropriate scientific knowledge. This calls for developing interdisciplinary studies of the public to understand individual processes of learning as well as to observe how science is used in personal and social settings. This may help practitioners improve their skills and strategies to engage with specific audiences. The study of science communication and its implications for society and social relations is a plus to better communicate the science of astronomy.

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