

# Is participation in Public Engagement an integral part of shaping physics students' identity?

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**Abstract.** In the “fake news” era and the blurring between facts and opinion, public engagement from physics departments has become an important task. Additionally, funding agencies are highlighting the importance of engaging the public’s interest in physics and reaching out to diverse populations. In university settings, we are seeing an increasing number of physics students choosing to participate in public engagement activities. However, the impact that participation in these programs have on the facilitators is largely understudied. In this study we seek to understand university students’ negotiation of physics identity after they participate as facilitators in three informal physics programs.

## 1 Introduction

Increasing the number, and diversity, of students who choose STEM subjects is a key educational objective of most EU Member States, as well as in the United States [cite]. In the last few years there has been an increase of programs, resources (including requirements within most grants), and public campaigns to attract students to STEM and increase representation. However, more work needs to be done to understand the deeper factors, such as student attitude, self-efficacy, sense of belonging, motivation, and identity, that have been shown to be important [3,4] for underrepresented minority students to pursue and persist in STEM fields. Informal science learning programs are often designed to address issues of representation by providing opportunity and spaces to build participants’ science identity. There has been some research on identity formation for youth in informal learning environments [X, X]. However, little work has been done on the people who facilitate these programs, who are often undergraduate and graduate students. This study will explore how physics identity may be fostered in university students through their participation in informal physics programs.

## 2 Framework and Analysis

The study looks to understand whether participation in different types of informal physics programs impacts university students’ physics identity and what specific experiences in those programs have significant impact. We take a Communities of Practice (CoP) lens [cite] to identify university students’ sense of science identity in a community of practice. This choice of framework is predicated on the idea that an informal program may serve as a community of practice for the university students who participate in it, and that this community membership affects their identity. The use of the CoP framework also helps

identify what experiences within those community of practices contributes to the participant moving toward the central layer of membership within the community.

Here we study students involved in three different informal programs (Science Theatre, PISEC Afterschool program, City of Physics) in order to investigate if their perceived physics identity is associated with specific characteristics of the programs or are a common factor across programs. The students in the study also have different majors, backgrounds, and career goals; we also explore the relationship between students' physics identity, participation in informal physics programs and these personal motivations and characteristics. Data for the study was collected through semi-structured interviews that asked participants to discuss their experiences in the programs, as well as their perceptions toward physics and informal physics programs. We operationalized constructs from the CoP framework based on the context of informal physics and physics communities and then used them to code the interviews.

### 3 Results and Implications

Preliminary results indicate that informal programs support university students by providing an outlet for their intrinsic interests in physics and education, by fostering meaningful relationships, and by positioning them as physics experts. However, results seemed to be different for undergraduate and graduate students. While for graduate students it seemed there is tension in their beliefs about the value of informal physics and their identities as physicists, for undergraduate student participation data suggests students felt their activities 'renewed' or 'reminded' them of their intrinsic motivations for pursuing a physics degree.

For graduate students that tensions was perceived by a disconnection between their sense of belonging to a physics research community and a lack of belonging to a physics outreach community. In the case of undergraduate students the act of taking part seems to have helped form a community of practice rather than informal program being just a place to express an identity already formed. This results seem to agree with our current perception of discipline based identity, PhD students have a stronger sense of discipline identity formed, while undergraduate students are just beginning to discover it and participation in informal physics programs provides an opportunity for them to explore that identity in a deeper way than their regular classes.

These findings can inform the development of better practices in informal physics programs that would allow participants to renegotiate their identity as member of the different communities and strengthen a sense of belonging, specially for minorities.

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