

Action research in non-formal education, outreach projects with networks of teachers in Michoacán, Mexico

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Abstract

In this study, we analyze the intention to implement workshops focused on basic concepts of Astronomy by elementary school teachers in their classrooms. An analysis was conducted on a sample, and the variables that influence the intention to implement the workshops by a group of teachers from the state of Michoacán are reviewed. The objective is to create a diagnosis that allows obtaining information to be used in a subsequent action research study, with the aim of generating improvements in the workshop offerings targeted at teachers so that they can replicate them.

Keywords: Astronomy Education, Astronomy instruction, Course evaluation, Astronomy in the classroom, In-service teacher training

1 Introduction

The Institute of Radio Astronomy and Astrophysics is located in the state of Michoacán, which ranks third nationally in educational lag (CONEVAL, 2021), which encourages us to propose teaching tools to improve the general astronomy knowledge in the state. With this in mind, we analyzed the optimal tools for providing non-formal education activities to groups of elementary-level teachers.

The COVID-19 pandemic forced us to transition from in-person to online modalities for basic astronomy courses implementation.

The number of teachers attended to by the outreach team of IRyA increased dramatically from 2018 to 2021, as shown in Figure 1, with a change in modality that allowed us to work with a larger number of people, removing the limitation of attending only inhabitants of the city of Morelia.

With the purpose of adapting the materials provided by the science communication team to different groups, we analyzed a survey of teachers who participated in a series of workshops related to basic astronomical knowledge that can be implemented by them in schools in the state of Michoacán. These results were compared with a larger group in order to determine if the results of our analysis can be extrapolated to the general teachers' population of the state.

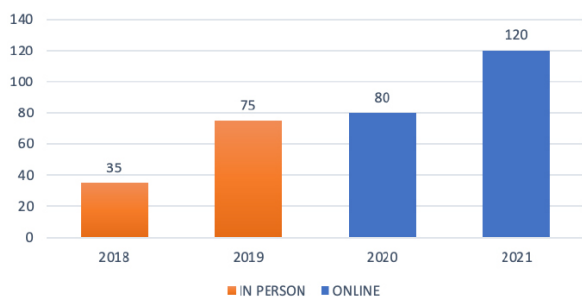


Figure 1. Number of teachers attend in period 2018 -2021. Credit: (IRYA, 2022).

2 Method

We examined the intention of the teachers to implement 11 workshops that were offered online from March to October 2022, working with a group of 27 teachers of primary level who provide attention to multigrade groups, in a program called "outstanding attitudes". We explored the correlation between their intention to implement the workshops and selected variables that might impact the outcome, as well as co-dependencies of variables through a Bayesian analysis.

3 Results

Figure 2 displays the implementation intent percentage of workshops schools that teachers have regarding the workshops previously attended. Full groups implementation intent is 46.5% of the total of workshops. Splitting up by age, we can clearly see that there is a higher implementation intent in the younger population. When segregating by connecting device, the implementation intent is higher for the users connecting through a smartphone. Finally, we cannot detect any statistic differences regarding the gender of participants.

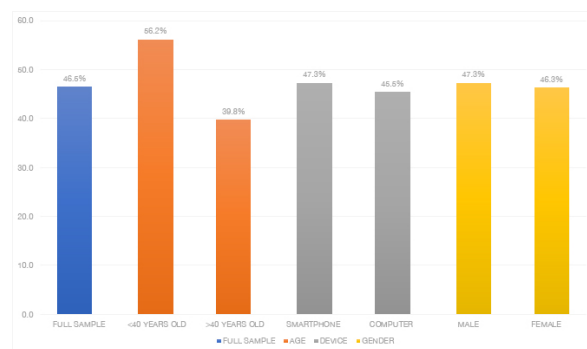


Figure 2. Percentage of implementation intent of teachers for the full and segregated samples.

Conducting a Bayesian test of co-dependence involving age and connecting device, we discovered that the disparities linked to the connecting device were influenced by an age-related bias. Consequently, age was identified as the most relevant variable.

In order to determine if our results are applicable to the full population of teachers of the state, we analyzed the age distribution of our survey group (group A) compared to a larger sample of teachers, selected from a more recent training activity involving teachers from different grade levels and locations (group B). By performing a Kolmogorov-Smirnov test, we detected that the survey group is biased (with a P-value = 0.2626), indicating that our results are only valid for a specific age range (Fig. 3).

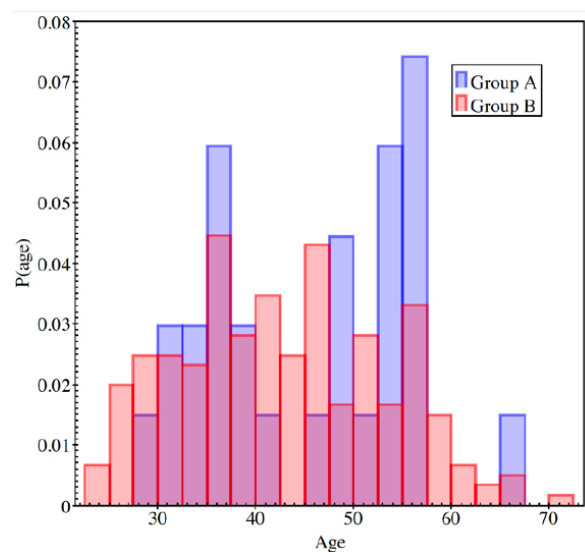


Figure 3. Age distribution for the survey group compared with a larger sample representative of the general population of teachers.

4 Present status

The outcomes derived from the quantitative study will be used as the foundation for conducting in-person sessions with the examined working group. These sessions will adopt a research-action approach, wherein enhancements to the workshops will be proposed based on the findings of this study. The objective is to ascertain the effectiveness of the modified workshops following the incorporation of insights gleaned from the analyzed data.

We will study the intention and actual implementation of the

workshops in reference to the inclusion of the topics covered by the official study program in the state of Michoacán.

References

- CONEVAL (2021). Nota técnica sobre el rezago educativo, 2018-2020. Technical report, Consejo Nacional de Evaluación de Política de Desarrollo Social, Ciudad de México.
- IRYA (2022). Reporte interno del área de divulgación. Technical report, Morelia.