

Bridging Secondary School and STEM Higher Education Through Interdisciplinary and Technology-Enhanced Interventions

Carolina Antonella Paulino¹, Facundo Carlos Namor¹

¹ Department of Food Science and Technology, Faculty of Food Science and Technology, National University of Comahue, Villa Regina, Río Negro, Argentina

carolina.paulino@facta.uncoma.edu.ar

INTRODUCTION & AIM

The transition from secondary school to STEM higher education represents a critical stage in which students frequently encounter difficulties related to foundational scientific competencies, including data interpretation, mathematical reasoning, measurement, modelling, and scientific communication. These challenges can negatively affect academic performance and contribute to early attrition in science and technology degree programs.

This work presents an interdisciplinary educational intervention developed within a university extension framework to support secondary school students during their transition to STEM higher education. The proposal integrates active learning strategies, collaborative problem-solving, and guided reflection on the use of artificial intelligence in scientific learning.

Aim

To strengthen foundational scientific competencies and promote responsible use of emerging technologies among secondary school students, facilitating a more equitable and successful transition to STEM higher education.

THE INTERVENTION: 7 WORKSHOPS + AI-ENHANCED ACTIVITIES



AI IN EXTRACURRICULAR ACTIVITIES



This approach promotes metacognitive awareness and encourages students to view AI as a tool for reflection rather than a substitute for scientific reasoning.

METHOD

- Participants:** Final-year secondary school students from public schools in Villa Regina.
- Setting:** University extension program developed through collaboration between the National University of Comahue and local secondary schools.
- Educational Design:** Seven interdisciplinary workshops integrating Physics, Chemistry, Mathematics and Biology.
- Pedagogical Approach:** Active learning, collaborative problem-solving, guided inquiry and evidence-based reasoning.
- Assessment:** Participant feedback questionnaires and qualitative reflections collected throughout the intervention.



PRELIMINARY PARTICIPANT FEEDBACK (n = 12)

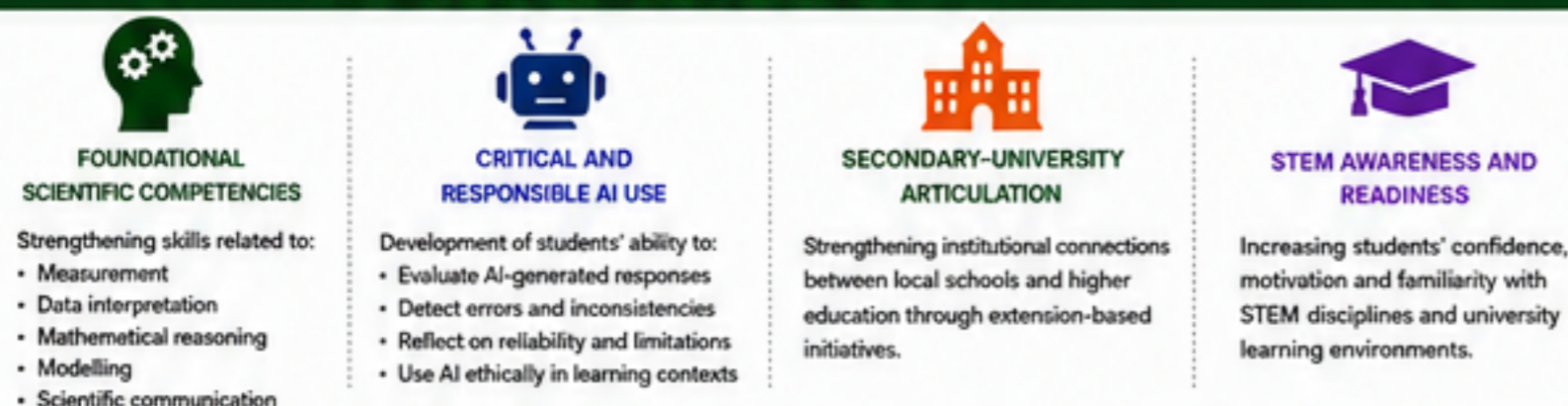


Qualitative responses highlighted:

- ✓ Better understanding of different types of graphs.
- ✓ Improved interpretation of scientific data.
- ✓ Appreciation of hands-on activities and demonstrations.
- ✓ Positive perceptions of collaborative learning.
- ✓ Interest in applying scientific reasoning to real-world situations.

Preliminary data intended to provide descriptive insights rather than measure learning gains.

EXPECTED CONTRIBUTIONS



CONCLUSION

Preliminary evidence suggests that interdisciplinary workshops combined with critical AI-supported activities are positively received by students and represent a promising strategy for strengthening STEM foundational scientific building strong connections between and higher education institutions.



FUTURE WORK

- Expand implementation to additional schools and regions.
- Conduct longitudinal evaluations of participants' academic trajectories.
- Investigate the impact of critical AI use on scientific reasoning.
- Develop open educational resources derived from the intervention.
- Explore the relationship between STEM readiness and university retention.

