Communicating Science course: Five-years Experience

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Abstract. Communicating Science is an elective, inclusive, general-purpose course aimed at equipping students with some basic non-disciplinary skills. The Physics & Engineering students group motivated by personal and professional interest, showed the best correlation with self-reported outcomes in terms of learning expectations, acquired skills, and self-confidence.

Introduction

The increasing call to extend formal education throughout people's lifetime is closely intertwined with the necessity to enhance researchers' capacity to communicate with non-experts. Academic institutions are thus tasked to provide a broader spectrum of courses tailored to accommodate the different demographics of the students and fostering an environment where academics feel empowered to communicate with audiences outside their specialized fields [1].

University of Bari have responded to this demand by implementing programs in Communicating Science [2] specifically designed to provide students with essential skills for proficiently conveying scientific ideas via digital media platforms. A key feature of this initiative is its inclusivity, accommodating students from diverse educational as well as non-academic backgrounds.

Research question

The current structure of the course content is visually depicted in the figure and comprises six ECTS (European Credit Transfer System) credits, which are nearly evenly distributed among various components: online lectures, seminars, individual practice sessions, and in-person teamwork. The content explicitly addresses the 5W + H golden rule of communication: Who, What, Where, When, Why, and How. This framework ensures that students learn to craft narratives that easily resonate with a broad audience [3]. To gauge the effectiveness of the course for such a diverse population, we resorted to the Science Communication Training Effectiveness (SCTE) scale, developed by Rodgers, Wang, and Schultz [4]. The analysis includes motivation of participants, their educational backgrounds, and their scientific areas, to assess which variable serves as a valuable tool for assessing participants' progress and skills acquired.

Method and findings

The enrolled attendees of five cohorts 2020-2024 are summarized in Table 1. Among the students who completed the final self-assessment form, the analysis primarily focuses on the Physics and Engineering subgroup, with comparisons made to the total population and the Physics-only cohort. The remainder of the population consisted of students from the Life Sciences and Social & Humanities domains.

Table 1. Population distribution among the chosen categories. (S) refers to the signed reported forms.

	Motivation			Degree			Tot
	Personal	Practical	Professional	Student	Researcher	Other	
Total (S)	44 (8)	65 (15)	46 (12)	97 (33)	22 (12)	36 (10)	155 (71)
Phys & Eng (S)	27 (11)	40 (19)	22 (16)	66 (28)	11 (8)	12 (9)	89 (45)
Physics (S)	7 (4)	13 (5)	12 (7)	23 (11)	2 (0)	7 (5)	32 (16)

The adopted SCTE scale assesses five elements: achieved learning expectation (LE), acquired cognition (AC), self-confidence (SC), affect/empathy (AE), and behaviour/attitude (BA). Participants self-reported their experiences using a Likert scale ranging from 1 to 5. Results from the

Physics and Engineering (P&E) group – 57.4% of the population and holding institutional significance as the course was designed and hosted by the Physics Department – are summarized in the figure. Scores for all five elements are predominantly high (> 85% rated 4 or 5), showing strong correlation (> 0.9) with both the total and Physics-only populations. However, LE stands out as significantly higher among physicists, with 25% rated 4 and 75% rated 5. Notably, only one of the instructors was a physicist, and disciplinary content was minimal, limited to some examples.

Correlation analysis across the five elements indicates that AC strongly correlates with all others (> 0.93 on average), while AE exhibits the weakest correlation (0.74 on average). Among the SCTE elements, AC, SC, and LE demonstrate the most substantial differences among input variables such as educational level and motivation, as shown in the figure (bottom right panel). Students and those motivated by personal interest report the highest perceived acquisition of communication skills, whereas researchers and those motivated solely by ECTS attainment report lower scores. Individuals driven by personal or professional interest, particularly those already engaged in science communication or aspiring to do so, exhibit a significantly higher overall appreciation of the course, approximately 10% higher than other groups.

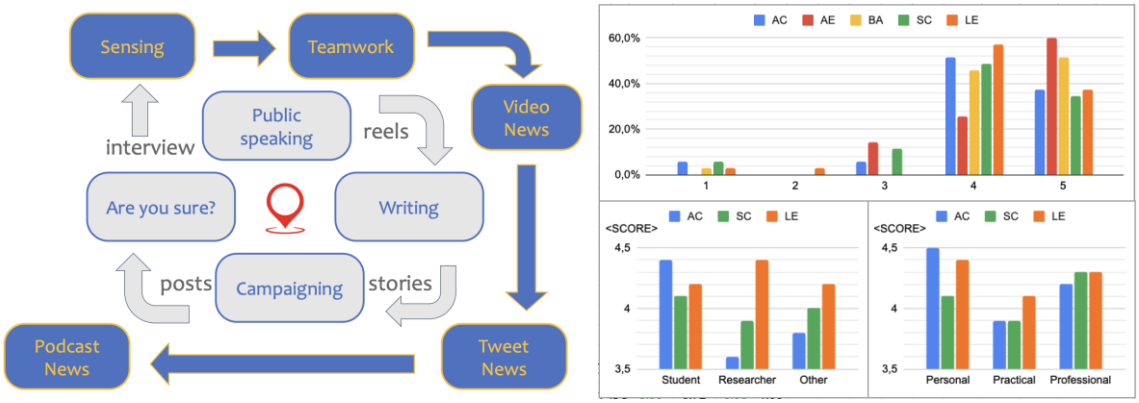

Fig. 1. The graphical representation of the course structure (left). Response of the P&E group (right top) according to the SCTE. Averaged P&E group response distribution for educational qualification and motivation (right bottom).

Conclusion

Communicating Science course received widespread appreciation from a diverse range of learners including undergraduates, master's and PhD students from various disciplines, as well as professionals in science communication. Motivation for enrolment emerged as the strongest variable influencing self-perceived positive outcomes, as indicated by the SCTE scale. This underscores the importance of personal motivation in driving successful engagement and learning outcomes in science communication endeavours irrespective of disciplinary knowledge background.

References

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