

Change – The transformative power of citizen science

Students as citizen scientists on social media: how do learners evaluate science communication on TikTok, Instagram and YouTube?

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Abstract

As part of the Citizen Science Awards in Austria, the project “We Talk About Science” explored how students interact with and assess science communication on Instagram, YouTube, and TikTok. Over three months in 2023, 21 school classes recorded 3,654 instances of science communication content. The study found significant differences in students’ abilities to critically evaluate this content, influenced by platform type and gender. Instagram posts received lower evaluations, and boys rated posts on Instagram and TikTok more negatively than girls. These findings highlight the need for educational initiatives to improve students’ critical analysis of science communication.

Keywords: science communication, social media, secondary school.

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Introduction

Scientific communication, i.e. the communication of scientific content to laypeople, has become an important aspect of scientific activity. Understanding science contributes to participation in society and is a prerequisite for making informed decisions and being able to actively participate in society (Davies and Horst 2016).

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However, the latest Eurobarometer shows declining trust in science and interest in science (European Commission 2021). It has already been shown for adults that the use of online sources can strengthen professional knowledge and trust in science (Huber et al. 2019) and enables informal learning in this area (Lundgren et al. 2022). The communication of scientific knowledge and science is also increasingly shifting to social media (Könneker 2020). Given that young people spend a significant amount of time on social networks (saferinternet.at 2024), they can also be considered as a target group for science communication.

The Sparkling Science project ‘We Talk About Science’ aims to study students as a target group for science communication by enabling them to communicate knowledge themselves. The goal is to develop criteria for effective science communication with students. In 2023, as part of the Austria-wide “Citizen Science Award”, school classes logged and rated science communication content from their social media consumption. The collected results were discussed in-depth with selected classes to better understand students’ consumption of such content (see Majcen & Spitzer in this proceedings).

Methods

Given this context, our research questions seek to explore how students experience and evaluate scientific communication in their everyday lives on popular social media platforms:

- **Focus 1:** What forms of scientific communication do students encounter in their everyday lives on familiar platforms such as Instagram, YouTube, TikTok, and other social media?
- **Focus 2:** How do students evaluate these science communication products?

Entire school classes participated in the award, with no restrictions on the choice of social media platforms. Participants could use multiple platforms and submit contributions from any of them. Students logged posts they identified as science communication, providing a screenshot, link, topic, and brief description. They then evaluated the posts based on attractiveness, technical accuracy, and scientific quality using a 4-point Likert scale. We hypothesized that students rarely encounter science communication posts in their everyday social media feeds, so we allowed targeted searches for posts. This implies that our conclusions are limited to the posts identified and evaluated by students. The main aim of the project was to assess the quality of the science communication content as perceived and critiqued by the students.

Results

Between April and July 2023, 21 school classes from 13 different schools across Austria participated in the project. A total of 3,654 protocols were compiled, offering insights into the consumption of science communication products (see Table 1).

Table 1. Description of the sample

sex	N	%
female	2776	76,6
male	721	19,9
diverse	127	3,5
total	3654	100,0

Most posts were recorded on Instagram, TikTok, and YouTube. Facebook, X, Telegram, and other platforms were used significantly less and played a minor role in the overall sample. To get an insight into popular accounts, accounts with the most submitted protocols were ranked. Table 2 lists the 10 accounts with the most logged posts across the three most frequently used platforms.

Table 2. Top-10-Accounts

	Instagram			TikTok			YouTube		
	Account	N	%	Account	N	%	Account	N	%
1	orf.at	94	8,3	jjchemistry	80	7,4	Biologie - simpleclub	96	9,4
2	abi2med	36	3,2	wissensbert	68	6,3	musstewissen Chemie	72	7,1
3	ericlagadec	26	2,3	nss3221	24	2,2	Dinge Erklärt – Kurzgesagt	61	6
4	physikcoach_robort	24	2,1	space.generation	21	1,9	Chemie - simpleclub	60	5,9
5	Doktor-wissenschaft	23	2	astroocomet	19	1,7	Lehrerschmidt	58	5,7
6	mrwissen2go	22	1,9	Rhombenikosidodekaeder	19	1,7	maiLab	54	5,3
7	zeitimbild	21	1,9	raysherifi	18	1,7	Physik - simpleclub	50	4,9
8	Deutschesgesundheitsportal	19	1,7	sciencefunn	18	1,7	100SekundenPhysik	31	3
9	quarks.de	19	1,7	lord_of_the_stars	17	1,6	wissensbert	25	2,5
10	Visionpflege	19	1,7	niklaskolorz	17	1,6	Vsauce	24	2,4
				Tamuphysastr	17	1,6			
	total	303	26,8	total	318	29,4	total	531	52,2

Instagram features three accounts—“orf.at”, “zeitimbild”, and “quarks.de”—operated by public broadcasters. These accounts do not appear in the top 10 on TikTok, where the content primarily focuses on astronomy. The content from the accounts on YouTube is predominantly categorized within the explanatory video sector.

It's not just the most popular accounts that vary depending on the platform. There are also clear differences in the evaluation of the contributions. Due to the high proportion of female students, the evaluation was carried out separately. Figure 1 displays the evaluations by female students, with average ratings consistently high, ranging between 3 and 4, indicating that the contributions were viewed very positively. For enhanced visualization, only areas 3 and 4 are displayed on the y-axis.

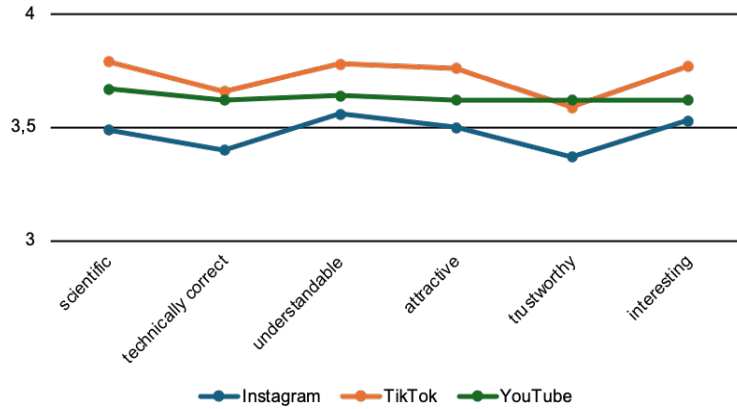


Figure 1. The figure displays the female students’ evaluation of posts on the platforms Instagram, TikTok, and YouTube, using a 4-point Likert scale (ranging from 1 = completely disagree to 4 = completely agree). For improved readability, the y-axis is not shown in its entirety.

An ANOVA revealed significant differences in the evaluations across platforms. The evaluations of the contributions by the male students are as positive as those by the female students (Figure 2).

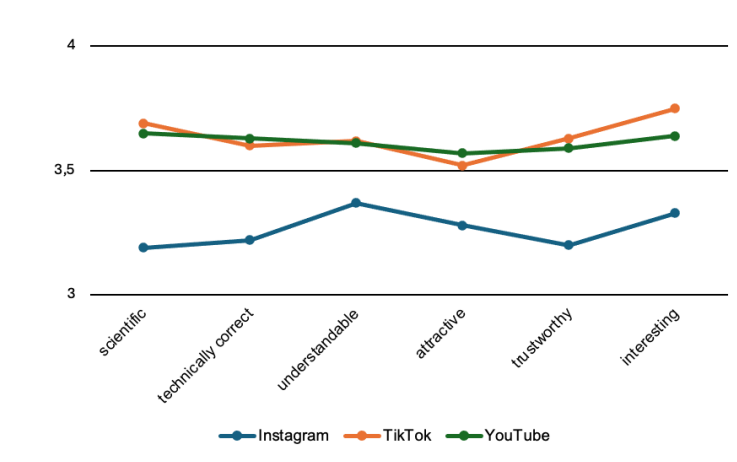


Figure 2. The figure displays the male students’ evaluation of posts on the platforms Instagram, TikTok, and YouTube, using a 4-point Likert scale (ranging from 1 = completely disagree to 4 = completely agree). For improved readability, the y-axis is not shown in its entirety.

Instagram are rated significantly lower than posts on TikTok or YouTube. In contrast, no significant differences were found between posts on TikTok and YouTube. Supplementary unpaired t-tests revealed that boys rated posts on Instagram and TikTok significantly more negatively than girls but no significant difference was found for logged videos on YouTube.

Discussion

The top 10 accounts list reveals differences in content consumption across platforms. Public broadcasters are prominent on Instagram but absent in TikTok's and YouTube's top 10, where explanatory videos dominate. Students rated contributions highly for scientific quality and technical accuracy, deeming them trustworthy. Despite data variability, incorrect markings were ruled out, suggesting students submitted high-quality entries. Without a given definition of science communication, students logged posts based on personal interpretations, leading to discrepancies with established definitions. Some ads and entertaining posts were incorrectly categorized as science communication. This indicates a deficiency in students' ability to assess content accurately. Instagram posts were rated significantly lower, with notable gender differences in evaluations of Instagram and TikTok posts. The reasons for the less favorable evaluations of Instagram posts are unclear.

Conclusion

Our study provides insights into how students evaluate science communication posts. Notably, posts on Instagram are rated significantly lower than those on TikTok and YouTube. The results also suggest that students lack a uniform definition of science communication and the necessary skills to independently assess such content. Given the increasing presence of science communication on social networks, there is a clear need for science education to enhance students' assessment skills.

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