A JOURNAL BY SISSA MEDIALAB

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SPECIAL ISSUE
Science communication in unexpected places

PRACTICE INSIGHTS

Three scientists walk into a bar... Approaching new audiences for informal science communication: the project “Plötzlich Wissen!” (Sudden Knowledge!)

Julia Schnetzer, André Lampe, Inga Marie Ramcke, Kerstin Kremer and Philipp Schrögel

Abstract

Sudden Knowledge! (Plötzlich Wissen!), a science communication format established through our own initiative as scientists, implemented science communication in a spontaneous conversational setting. It combined elements of guerilla science/street science, science busking and pub science events. Between 2017 and 2020 the project — centered on marine science — was presented in 16 major German cities. This novel approach, using puppetry and hands-on experiments sparked interest in science and reached non-academic audiences. During the COVID19-pandemic, the format transitioned to online livestreaming on the platform twitch.tv, using video games as entry points for conversations about marine sciences. Between 2020 and 2024 we performed 55 livestreams. Here we outline the development of the format, share evaluation data and our experiences. Our main goal is to provide practical recommendations for scientists who are interested in using informal, guerilla style approaches to reach audiences who might not be reached by traditional science communication strategies.

Keywords

Environmental communication; Science and technology; art and literature; Digital science communication

Received: 31st May 2025
Accepted: 30th December 2025
Published: 11th February 2026

1 ▪ Introduction

The notion of informal science learning provides a reference for situating innovative approaches to science communication. Formal learning is typically associated with schools and universities, characterized by structured curricula, defined learning objectives, and assessments designed to measure progress and accuracy. In contrast, informal learning encompasses all those situations in which individuals gain new knowledge and experiences outside institutional settings. Traditionally, places such as museums, science centers, zoos, aquaria, and botanical gardens have been regarded as informal learning environments. However, this definition can easily be extended to include all public spaces, digital media, the internet, and virtually any context that allows people to engage, explore, and develop new understandings. John Falk [2001] refers to this broad and self-directed spectrum of learning opportunities as *free-choice learning*.

Yet, the field of science communication has become considerably more diverse in terms of informal science learning formats in the past years, with formats ranging from public talks to entertaining science festivals, participatory dialogue events or children's universities. However, many of these approaches share that they are inviting audiences to join places of science, to participate in events that build on an existing interest in science and an existing motivation to join. This, together with a series of other exclusion factors and barriers shapes science communication audiences that are less diverse, with various parts of society feeling "disengaged" and that science is "not for me" [Humm & Schrögel, 2020].

An often overlooked part of science learning and science engagement takes place outside of formalized educational environments and even outside of established science communication formats (such as traditional evening lectures but also more innovative science festivals) and outside of science-related places (such as university grounds or museums). Structured and research focused description of sience learning in these formats is rare to date. Empirical evidence across initial studies shows that "everyday learning — the things people learn by engaging in the everyday activities of life" can "support science learning for virtually all people" [Bell et al., 2009, p. 2]. This is also true for informal science learning through media, which go beyond educational broadcasts: "Science education has evolved in a new social context. News and entertainment media merge with natural history museums and science centers, after-school programs, and computer games and gaming communities to reshape the world and people's exposure to science." [Bell et al., 2009, p. 15].

In this article we introduce the project Sudden Knowledge! that aligns with frameworks of informal and free-choice learning [Falk, 2001] and everyday engagement [Bell et al., 2009]. With its two components it implemented informal science learning experiences within the real-world and the virtual-world spheres: Starting in 2017, the project was initially funded as part of the German Science Year 2016*17, an initiative by the German Federal Ministry of Research, Technology and Space (formerly: Education and Research), which focused on the theme *Seas and Oceans* at that time. The project team consisted of three scientists[1] who unannouncedly visited various public spaces, such as bars, beer gardens or parks in cities around Germany. The approach was not to deliver formal presentations but rather to use creative methods to initiate casual conversations about scientific topics with the people around, primarily related to the marine environment. As the COVID19-pandemic hit in 2020,

1. The team consisted of three of the authors of this Practical Insight: André Lampe (physicist), Inga Marie Ramcke (science educator), Julia Schnetzer (marine biologist).

the project shifted from “The Real World” to “The Virtual World”. In keeping the core aspects of unexpected places, creative methods and a conversational style, the chosen approach used live streaming of gaming-sessions (“Let’s Play”) in combination with discussions and chats with the online audiences. In this article, we give a foundation of the approach within the literature, outline the development of the format, share evaluation data and recommend first-hand experiences for interested scientists.

1.1 ▪ *Literature review — theory and background*

The concept of the real-world implementation of *Sudden Knowledge!* builds on the concept of *Guerilla Science*, meaning it “creates encounters with science ideas that are embedded in engagement formats not typically associated with audiences with traditional informal science education. These events take place in the places and spaces where science is least expected, for example music and arts festivals, disused urban spaces, and nightclubs.“[Rosin et al., 2021] Guerilla Science “attracts a wide variety of culturally interested and engaged people by sparking their curiosity [and invites a] “latently” interested public to engage as they may not otherwise choose to participate in more traditional science learning activities elsewhere.” [O’Connell et al., 2018] Specifically, *Sudden Knowledge!* uses science busking — visiting everyday spaces [Humm & Schrögel, 2020] and approaching people in a street performance with experiments or discussion starters [Illingworth, 2017].

One main method as part of *Sudden Knowledge!* to spark interest was the use of puppetry. The tool has been proven useful especially in elementary and secondary education, supporting a positive classroom climate, changing attitudes [Kröger & Nupponen, 2019] and increasing the motivation for science [Potgieter et al., 2018]. These effects can also be utilized when interacting with adults in informal, leisure-oriented settings and provide a stimulus for discussion and connecting the research topic with personal meaning, an emotional touch and ecological understanding. The setting of direct, interpersonal interactions and conversations in small groups rather than stage presentations further reduces barriers, as has been shown through observations at similar events: “these conversations show promise for high public engagement with science and opportunities for true mutual learning between scientists and non-traditional public audiences.” [Stofer et al., 2019]. The choice of bars and cafés as unexpected places for science communication has become an established format for public engagement with a variety of names: pub science, science café, science on tap and others [Navid & Einsiedel, 2012]. However, since these formats are specific events that are advertised as science communication, they tend to attract primarily the already interested and academics and therefore are “preaching to the choir” [Ocobock & Hawley, 2020].

The second, virtual-world component of project *Sudden Knowledge!* builds on existing strategies for digital science communication and expands them. Online videos on platforms such as Youtube are an important part of online science communication, with a large variety of formats and styles, from educational videos on the channels of academic institutions to cooperation with influencers [Kaul et al., 2020]. At the same time, digital games are also offering a large spectrum of possibilities for science communication, from serious games or learning games to informal learning opportunities provided in primarily entertainment oriented games [Voulgari, 2020]. Located at the intersection of both realms, live streaming of gaming sessions (“Let’s Play”) through the platform twitch (twitch.tv) has been discussed

as a medium for science communication [Ather, 2019]. The potential audience in Germany amounts to 6 out of 10 (∼50 million) residents who consume games regularly [The German games industry association, 2024] and 18 million residents consume gaming livestreams and "Let's Plays" regularly [Stuebing, 2023].

1.2 ▪ *Literature review — practice overview*

Science busking street performances have been implemented by some organizations around the world, e.g. in Singapore [Science Centre Singapore, 2025] the United Kingdom [Science Made Simple Ltd., 2025] or in Korea [Lee, 2017]. However, no further research on these projects or evaluation data is available. The effects of a similar arts-based approach with street theatre performances on smart city development and data protection in the Netherlands were investigated through semi-structured interviews with audience members and unstructured observations by the research team [Fraaije et al., 2023]. The results show, that the format engaged "people who did not normally engage with the topic of smart cities" [Fraaije et al., 2023, p. 7] and created further conversations and engagement with the topic — a finding in line with earlier works [Davies et al., 2012]. However, the creative approach can also pose a challenge as the authors reflect: "these methods do generally excel at engaging wider perspectives, triggering in-depth reflections and exploring the social implications of future technologies, while they struggle with perceived plausibility and relevance." [Fraaije et al., 2023, p. 12]

Also for live-streaming, especially in combination with gaming, only very limited research has been conducted regarding its use and effects, despite the fact that the format has been discussed early on [Wood, 2017]. Reflecting on the existing evidence, Jodén & Strandell find that "previous research on Twitch suggests that interaction plays an important role in successful streams for learning, creating shared meaning and shaping pro-social behavior" [Jodén & Strandell, 2022, p. 1970]. A study on climate change discourse on twitch highlights the potential — as it shows that "Twitch is an emergent locus for climate discussion with a thriving community of young users interested in the topic." [Navarro & Tapiador, 2023]. For educational contexts, an exploratory study of Let's Play workshops found that "students actively build new knowledge and skills, create graspable outcomes, discuss them and do so in personally or socially relevant contexts." [Göbl et al., 2022].

Given the very limited body of research on both science busking and live-streaming in educational and science communication contexts, it becomes all the more important to document and reflect on practical experiences with these formats. This article therefore focuses on capturing and analyzing such reflections to contribute to the emerging discourse.

2 ▪ Project phase 1 — "the real world"

2.1 ▪ *Concept & implementation*

During the initial phase, starting in May 2017, we (Figure 1) visited various locations (e.g. pubs, beer gardens, parks, beaches) in different cities in Germany, instead of creating an event where people must actively choose to participate. Our format establishes science communication in a conversational setting, combining elements of guerilla science, street science, science busking and pub science events. We focused on main environmental topics

of ocean science such as ocean acidification, plastic pollution, sound pollution or biodiversity loss. Given that *Sudden Knowledge!* is an unannounced format without a stage, we had to actively seek out and acquire our audience.

To get attention we used a wooden sign with catchy sentences and curiosity-raising questions such as "Ouzo, farts and fake eggs[2] — do you want to know more?" (including a pun: the German word "Meer" sounds similar to "mehr" meaning "more"). Another important element to attract attention was a Dugong (marine mammal) hand puppet, played by one of the scientists (Figure 1). Those were important requisites, which helped us to initiate a conversation with our random participants and open up conversation about the scientific background of these eye-catchers. A talking hand puppet made the first contact with people a lot easier, as it sparked their curiosity and their willingness to listen. To make those interactions interesting, educational and entertaining we developed simple "take along" experiments which helped us illustrate topics such as acidification of water through carbon dioxide, sound wave behavior in water, or density probabilities of water (Figure 2). Given that we created a dialogue-oriented format, our audience also determined topics and asked questions. This resulted in very diverse questions (Figure 3), ranging from biology (Why are whales so big?) to engineering (Why is only sea sand suitable for concrete production?) to everyday life observations (Why does water spin in a certain direction when draining?). If we could not answer those directly, we thoroughly researched them afterwards and published the well-founded answers on our website http://www.ploetzlichwissen.de. This website served as a central platform and comprehensive resource and was promoted during the tours with calling cards and stickers, as well as the project's eMail and social media channels and was promoted during the tours with calling cards and stickers, as well as the project's eMail and social media channels. It still hosts detailed descriptions of all our conducted experiments and the discussed scientific topics, as well as our tour diaries. All content on this website is freely accessible and usable under the open license CC BY-SA 4.0. Live content from the tours was also shared via social media (Facebook, Twitter, and Instagram) providing access to information for those who did not encounter the team in person.

2.2 ▪ *Evaluation methods*

The on-site interactions of phase one were to some degree externally evaluated through a master's thesis [Bittner, 2018]. Evaluation methods comprised semi-structured qualitative interviews with the project team prior and post as well as a semi-structured observation of the interactions and a standardized questionnaire handed to the small group audiences afterwards (considering socio-economic background, experiences with science communication and assessment of the format with regards to enjoyment and self-reported learning). Data was taken during five of the sixteen tours through cities in Germany between May 2017 and October 2018. Practical recommendations are also based on unstructured qualitative observations by the project team.

2. "Ouzo" leading to an experiment, using Ouzo, about light scattering and why the ocean is blue. "Farts" referred to the explanation why the sea has a typical smell, produced by phytoplankton. "Fake eggs" to talk about how poaching trade routes of turtle eggs were discovered by GPS trackers in 3D-printed eggs.

Figure 1. Left: use of sign and hand puppet: the *Sudden Knowledge!* team (from left to right: André Lampe, Julia Schnetzer, Inga Marie Ramcke + puppet) in action, presenting an experiment to an audience sitting outside of a bar in Berlin with the sign and the Dugong hand puppet. Upper right: puppet in dialogue. Lower right: the sign.

Figure 2. Cloud tank experiment (left) and the necessary utensils (right): actually used as a visual effect in movies to simulate clouds, it was used as an experiment on PW-tours to show density differences of fresh and salt water to explain how ocean currents are driven by density differences.

2.3 ▪ *Results & discussion*

Over the course of all sixteen tours, the format reached out to more than 500 people. Within the five tours with in-depth evaluation 150 participants were involved.

In a guerrilla setting, where people are unexpectedly approached during their leisure time, it is particularly challenging to motivate them to participate in a survey.

In total, 27 participants filled out a questionnaire. Genders were distributed (14 female, 13male), with ages between 21 and 58 years, with the majority between 21–30 years [Bittner,

Figure 3. Participant holds a card where he has written down his question. (Do crustaceans suffer from cancer?)

2018]. The evaluation results of Bittner [2018] showed the overall perception of *Sudden Knowledge!* was predominantly positive. The element of surprise, the spontaneity and unexpectedness of the *Sudden Knowledge!* approach was considered very important or important by 22 participants. Besides this, 17 rated the face-to-face interaction with the scientist as very important or important, and information about their daily work was mentioned as one of the most interesting points. And 21 stated the use of the requisites and experiments as very important or important assets and everybody agreed on the usefulness. Hence, did work as icebreakers and make the interaction more appealing.

Most importantly, the data showed that we achieved our desired goal and reached many people, including those with lower formal education backgrounds. The survey data showed that while a majority of participants had a higher education degree, a third had less than a high school diploma (9 participants). Our personal observations also indicated that we connected with individuals beyond academia, such as 'housewives or supermarket cashiers or even homeless people', many of whom do not typically engage with marine and ocean science. The majority of survey participants answering the question (23 in total) reported having visited a science museum in the last 12 months (12 participants — 52%), and 6 (27%) had visited a University Open Day or a Long Night of Science in that time. Although the sample size does not allow for a detailed statistical comparison, this suggests a slightly higher level of science engagement as for the average population in Germany [Wissenschaft Im Dialog, 2019]: in comparison, in the German population, 21% of respondents had attended a University Open Day or a Long Night of Science in the previous year, and 40% visited a museum. However, the small sample size of the project evaluation and the setting made the results prone to a response bias by academics. Additionally, the cities we visited were home to one or more universities and museums. Proximity to such institutions and

therewith easier access might potentially increase the likelihood of encountering individuals with academic affiliations or interests.

Overall, 21 respondents (80%) agreed that *Sudden Knowledge!* sparks interest in the topic of seas and oceans as well as science in general. An interesting strategy would be to transfer tours to suburban or rural regions, to increase the likelihood of encountering individuals with lower levels of prior engagement or interest in scientific topics.

All encounters we had during our tours were overwhelmingly positive. This impression is corroborated by an exemplary statement of an audience member during a media interview about the project [Kaiser, 2018]:

> "Would you say that you learned something you didn't know before? Of course. Yes. A lot about water quality in the oceans, and yes…"

This face-to-face contact, and the fact that we engaged in dialog, not only in "sending" our messages, we are sure, will have a lasting impact. However, face-to-face contact does hold its challenges for the scientist itself. It is not always easy to just approach people and although the big majority of people were very friendly. Sometimes, especially in the late evenings, we did encounter people who did try to provoke. We were also confronted with criticism regarding the science system, but were always able to contextualize and to explain the realities from a scientist's point of view — when focused on earnest dialogue, we never encountered outright hostility or science denialism.

Albeit the meaningful impact of our guerilla dialogue-based approach, it is not easily scalable. Face-to-face interactions need to be on an individual or small group basis, and can not be transferred one-to-one to a stage or video format.

2.4 ▪ *Practical recommendations*

Recommendations for concept and planning:

- Don't be afraid to get creative. Use everyday objects to explain science that makes it more relatable. Same goes for everyday life references.
- Test your content beforehand with "outside-of-the-field" friends to get feedback and improve before you go in the field.

Recommendations for communicating:

- Catch the interest of one person, chances are high you get the interest of the whole group or other bystanders.
- Listen to your audience, sensibly.
- Stand out and catch interest with interesting requisites.
- Use interactive and playful ways to communicate your topics.
- Don't be afraid to simplify complex topics.
- Do not avoid technical terms, but reduce the number and explain the used ones.

- Do not underestimate the people you talk to.
- Engaging in dialog is key to this approach, allow questions and a conversation to happen, do not act as only a sender or a presenter.
- Be prepared to write down good questions or suggestions for content from the people you encounter, to evaluate later on what of that is worthwhile to prepare as content.

Recommendations for implementing the activity:

- Be approachable. Show your audience that you are a human being just like them.
- Be a mindful team member. Constantly exposing themselves and giving a lot away, is strenuous and goes to personal limits, making one vulnerable. Pay attention if your team member is overwhelmed or needs a break, as the team provides crucial support and backup in these challenging situations. Good teamwork and trust are essential for this mutual support.
- Bring materials with your project's contact information to ensure the audience can easily find and engage with your project afterward.

3 ▪ Project phase 2 — "the virtual world"

3.1 ▪ *Concept & implementation*

Due to the COVID19-Pandemic and its associated restrictions, meeting people directly in public spaces was no longer possible. Direct interaction and dialog however was the core strength of the project. Therefore, *Sudden Knowledge!* transitioned to an online approach and started live streaming on twitch, a platform, which was at that time, predominantly known for gameplay or "Let's Play" livestreams and related topics of the gaming community.

To once again implement the guerilla strategy, the popular "Let's Play" format was used. This meant we did live streaming computer game sessions while providing live commentary. The twist was that we chose games with marine themes (e.g. *Beyond Blue*, *Abzû*, *Deep Diving Simulator*, *Koral*) and used their content to discuss our core topic marine sciences (Figure 4). Since it was a live format, direct interaction and dialog with viewers was possible via the chat. To stay connected with our audiences outside of twitch, announce upcoming streams, and foster a sense of community a *Discord* Server was set up. *Discord*, an instant messaging and VoIP platform, is widely used by German streamers. It is organized into persistent chat rooms, known as "servers", which are accessible through invitation links. Additionally, the platform was used for internal communication, handling audio and video connections between team members during livestreams.

After a few livestreams we began to diversify our program and explored other content formats. We started conducting experiments and in depth scientific paper discussions, offering viewers valuable insights into the scientific process (Figure 5). Failed experiments were openly discussed with the audience and repeated in following livestreams until they succeeded, creating a "cliffhanger" effect and sparking engagement.

Due to feedback from our viewers and because of the limited number of suitable marine themed games, later livestreams focused mainly on beforehand prepared segments on

specific topics, centered around scientific papers, which we presented to each other and the viewers. This was frequently followed by gameplay and occasional experiments.

3.2 ▪ *Evaluation methods*

Due to the unforeseen and initially improvised switch to an online format because of the COVID19-pandemic, no formal evaluation concept has been established for phase two. The insights presented here are based on a retroactive analysis of available quantitative metrics of the streaming events as well as unstructured qualitative observations by the project team and exemplary audience reactions.

3.3 ▪ *Results & discussion*

The main challenge of the virtual approach was attracting viewers and building a follower base. The *Sudden Knowledge!* team member André had been running a science-related channel on twitch for several months prior, giving him valuable experience and familiarity with the platform. His channel provided us with a first small base of initial viewers.

We demonstrated how scientific knowledge is produced and shared, guiding viewers on how to access and read scientific literature themselves. This change into more of a "chat show" format similar to podcast styles described by [Drew, 2017] was successful and viewers actively engaged through the chat. In the 53rd Live-Stream about Sargassum algae Julia observed during a science expedition (at time 00:31:21, "Abtauchen mit PW! #53 (Teil 2/2) Julias Forschungsausfahrt in die Sargasso-See zu den Algenteppichen", https://youtu.be/_w9NO_XaTec?feature=shared&t=1881) it was asked in a back to forth part of the video in quick succession: "What does the CO_2 turnover look like?", "The stuff looks more yellow than green, doesn't it?", "Do the drifters transmit any other data besides location?", "In terms of CO_2, it would then act similarly to a swamp, as long as it doesn't eventually come back up as methane, right?"

With such questions and sharing links on our Discord server, suggesting topics for future livestreams, the viewers shaped the direction and the content of the stream.

Generating followers on twitch is a challenge. Successful streamers stream several hours per day on multiple days per week. Additionally, twitch rewards active streamers and makes them affiliates if they reach predefined milestones. Being an affiliate provides them with additional functionalities that enhance viewer engagement and community building (e.g. using polls in the chat), which are not available otherwise. However, expanding our streaming activities was neither, timewise nor contentwise, feasible for us. Nonetheless, we were able to build a community of 317 followers. One important contribution to audience building was a specificity of the twitch universe: we gained almost half of our followers, about 150, after the popular german science podcast "Methodisch Inkorrekt!" "raided" our stream. The term "raiding" refers to the practice of one channel ending its broadcast by sending its viewers to another channel that is currently live. Building connections with other streamers and being the target of raids played a key role in growing our audience and increasing follower numbers. We developed a small but committed community (mean 67,2 stdv 30,5 "unique viewers reached" over 39 Live-Streams after the raid in Live-Stream "Abtauchen mit PW #16 Ein Walross auf den Ostfriesischen Inseln") who joined almost every stream and actively

engaged in the chat. Their consistent presence gave the streams a welcoming, familiar atmosphere — complete with inside jokes and shared rituals [Jodén & Strandell, 2022]. Between November 2020 and November 2024, we produced 55 livestreams, averaging at 141,5 minutes +/- 25,2 minutes in length. All of these remain accessible on our YouTube channel: https://www.youtube.com/@plotzlichwissen8862.

Nowadays, creating a high-quality streaming setup is affordable and accessible to almost everyone. A stable Internet connection with > 10 Mbit/s upload speed and specialized software is required to design and broadcast various scenes of a stream. We used *OBS Studio*, a free and open-source software for video recording and live streaming [Kristandl, 2021]. To ensure a stable stream of gameplay, along with audio and video from all three *Sudden Knowledge!* team members, proper technical equipment is necessary. This includes, among others, a computer with specifications beyond a basic office computer (e.g. a dedicated gaming-compatible graphics card), external microphones and headphones was required.

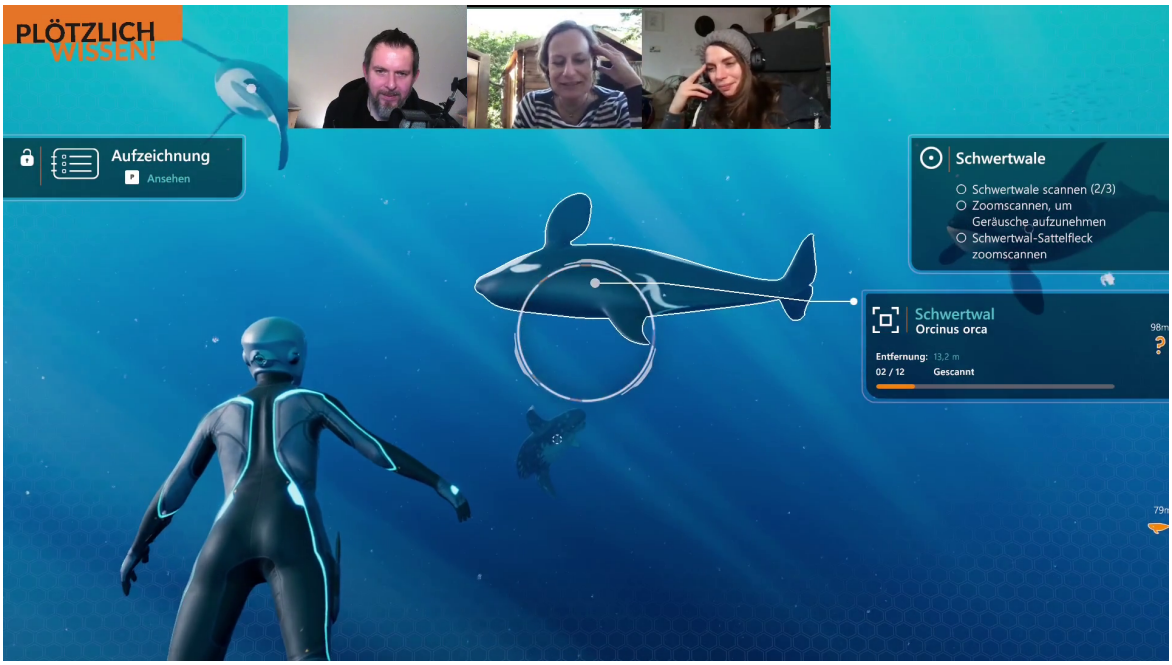

Figure 4. Screenshot of a "Let's Play" format. *Beyond Blue* gameplay featuring all three *Sudden Knowledge!* team members. The game's content, such as the appearance of orca whales, served as a starting point for in-depth discussions on related scientific topics.

3.4 ▪ *Practical recommendations*

Recommendations for concept and planning:

- Streaming is technically challenging and does need capable hardware and specialized software.
- Ideally, more than one person should have the knowledge and equipment to stream.
- Understand the platform you are using. Use it beforehand to get an understanding about the culture and ways people interact with each other and consult "plattform natives".

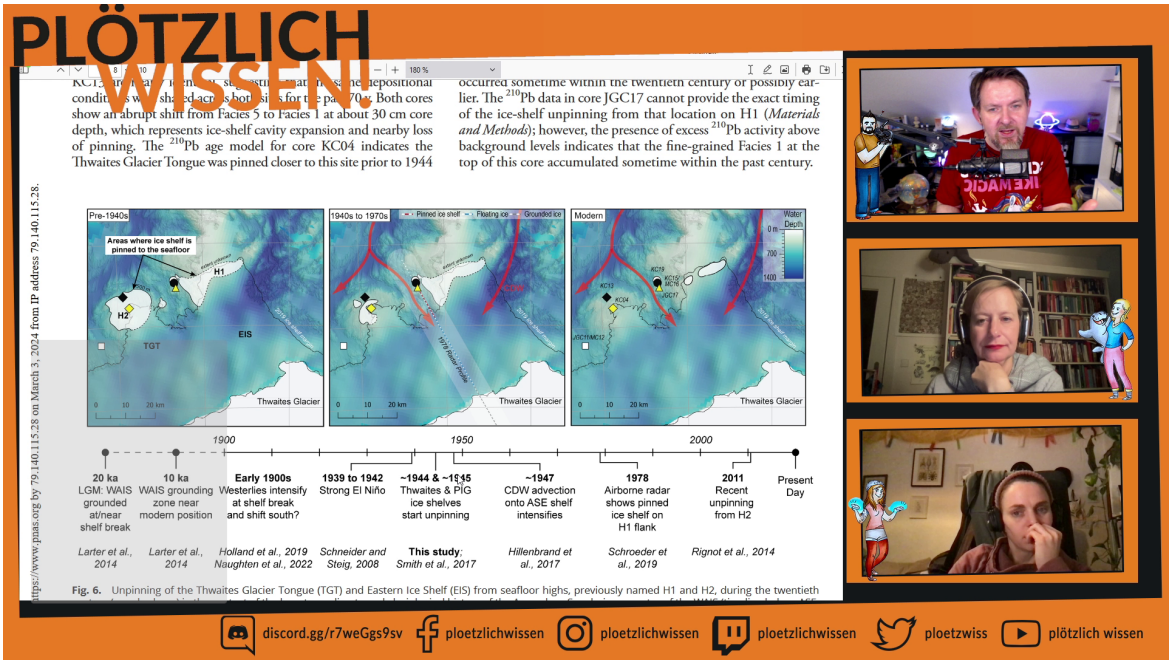

Figure 5. Screenshot of a “chat show” format. Explanation and discussion of the scientific paper [Clark et al., 2024] about the retreat and detachment of the Thawes glacier and its potential contribution to sea level rise.

Recommendations for communicating:

- Use platform-typical ways to communicate. Take small to medium content creators as a blueprint.
- Engage with other creators to collaborate and expand your reach. Most platforms provide built-in tools to support cooperation and help direct audiences toward collaborators and fellow content creators.

Recommendations for implementing the activity:

- Good video and above all good audio quality is mandatory to keep viewers.
- For streaming a reliable, regular livestream-schedule gives better view counts and can lead to easier audience growth.

4 ▪ Conclusion

4.1 ▪ *Limitations*

The results and recommendations presented here can only serve as a first indicator. Given the small sample size of the empirical survey and the limited methodological rigour of the project primarily developed as a practice project, the recommendations can serve as hands-on insights for science communication practitioners, while a more detailed empirical corroboration remains to be done. The same holds true for insights regarding the online component, which can serve as a proof-of-concept, while scaling-up the project and

long-term observation of effects and engagement in the live-streaming community need to be investigated further.

4.2 ▪ *Avenues for future research*

The interactions observed suggest that even brief, unscripted encounters can foster curiosity and a sense of personal relevance — key precursors to sustained engagement with science. At the same time, the format reveals the limits of spontaneous, unstructured communication: while it lowers thresholds for participation and attracts non-academic audiences, it offers little control over the depth or durability of learning outcomes.

Given the limited empirical evidence on the effects of guerilla science communication and science busking performances, future research should systematically gather and compare data across different projects and contexts. Comparative analyses with other performative science communication formats (e.g., science slams, theater-based outreach) could reveal how the degree of interaction, setting, and spontaneity influence engagement and understanding. Likewise, the growing importance of digital live-streaming formats — as used in Sudden Knowledge! during the COVID-19 pandemic — calls for closer examination. While a large body of research exists on science communication videos (e.g., YouTube), the real-time, dialogic nature of livestreams introduces qualitatively different dynamics of audience participation, authenticity, and co-construction of meaning that remain underexplored.

Integrating these observations into existing theoretical frameworks could yield new insights into hybrid approaches that combine street-level immediacy with digital reach. Such models may expand the inclusivity and sustainability of science communication while maintaining its dialogic and experiential character. We therefore propose that future studies examine the potential and limitations of hybrid, guerilla-style communication through mixed-methods designs, combining observational, survey, and discourse-analytic approaches to capture both cognitive and affective dimensions of engagement.

In summary, Sudden Knowledge! illustrates the transformative potential of informal, participatory science communication for fostering authentic encounters with science. At the same time, it highlights the need for a stronger empirical and theoretical foundation to understand how such formats contribute to public conceptions of the nature of science, and how they might complement formal and institutional learning environments in the long term.

4.3 ▪ *Insights from the project for global science communication practice*

Our guerrilla-style approach enabled us to reach a remarkably diverse audience, including individuals with no prior academic background or intrinsic interest in science. Through direct, spontaneous engagement — both face-to-face and online — we were able to spark curiosity not only about marine sciences, but also about scientific inquiry more broadly. During our tours, spontaneity and the creative use of simple props proved crucial in fostering authentic interactions and lowering barriers to participation. In contrast, the virtual format provided opportunities for more sustained engagement, allowing us to explore scientific processes in greater depth through live experiments and discussions.

For many participants, these encounters represented their first personal interaction with practicing scientists. Such moments of direct dialogue humanized science and offered

participants insight into the uncertainties, creativity, and collaborative nature of scientific work. While these encounters were often more demanding than traditional forms of science communication, they were equally more rewarding — both for the audiences and for us as scientists. The genuine curiosity and appreciation expressed by participants illustrate the potential of dialogic and experiential approaches to bridge the gap between scientific and public spheres.

From a theoretical standpoint, these observations support notions of dialogic engagement and free-choice learning, emphasizing that meaningful science communication occurs when audiences are treated as co-participants rather than passive recipients. We encourage future projects and corresponding empirical studies to further explore how such approaches can sustainably connect science with audiences traditionally unreached by formal or institutional outreach.

Acknowledgments

We thank the German Federal Ministry of Research, Technology and Space (formerly: Education and Research) and Robert Bosch Stiftung for funding. Furthermore, we thank Leibniz University Hannover and Justus Liebig University Giessen for administrative support. Finally, we thank Laura Bittner, Philipp Niemann, Henning Krause, Marius Wache, Reinhard Remfort, Nicolas Wöhrl, Ralph Ruthe, discord-User "Pingu" and our discord- and twitch-community for their support.

References

Ather, S. H. (2019). Livestreaming science. *Science*, *365*, 294–294. https://doi.org/10.1126/science.365.6450.294

Bell, P., Lewenstein, B., Shouse, A. W., & Feder, M. A. (Eds.). (2009). *Learning science in informal environments: people, places and pursuits*. National Academies Press. https://doi.org/10.17226/12190

Bittner, L. (2018). *Guerilla-Wissenschaftskommunikation in der Kneipe: Untersuchung am Projekt "Plötzlich Wissen!"* Germany, Karlsruher Institut für Technologie (KIT). https://doi.org/10.5445/IR/1000132272

Clark, R. W., Wellner, J. S., Hillenbrand, C.-D., Totten, R. L., Smith, J. A., Miller, L. E., Larter, R. D., Hogan, K. A., Graham, A. G. C., Nitsche, F. O., Lehrmann, A. A., Lepp, A. P., Kirkham, J. D., Fitzgerald, V. T., Garcia-Barrera, G., Ehrmann, W., & Wacker, L. (2024). Synchronous retreat of Thwaites and Pine island glaciers in response to external forcings in the presatellite era. *Proceedings of the National Academy of Sciences*, *121*, e2211711120. https://doi.org/10.1073/pnas.2211711120

Davies, S. R., Selin, C., Gano, G., & Pereira, Â. G. (2012). Citizen engagement and urban change: three case studies of material deliberation. *Cities*, *29*, 351–357. https://doi.org/10.1016/j.cities.2011.11.012

Drew, C. (2017). Educational podcasts: a genre analysis. *E-Learning and Digital Media*, *14*, 201–211. https://doi.org/10.1177/2042753017736177

Falk, J. (2001). *Free-choice science education: how we learn science outside of school*. Teachers College Press.

Fraaije, A., van der Meij, M., Vermeeren, A., Kupper, F., & Broerse, J. (2023). Creating room for citizen perspectives in 'smart city' Amsterdam through interactive theatre. *Research for All*, *7*. https://doi.org/10.14324/rfa.07.1.05

Göbl, B., Jovicic, S., Denk, N., Wimmer, S., & Kriglstein, S. (2022). More than just gameplay: making a case for "Let's plays" in education. *Extended Abstracts of the Annual Symposium on Computer-Human Interaction in Play*, 75–80. https://doi.org/10.1145/3505270.3558327

Humm, C., & Schrögel, P. (2020). Science for all? Practical recommendations on reaching underserved audiences. *Frontiers in Communication*, *5*. https://doi.org/10.3389/fcomm.2020.00042

Illingworth, S. (2017). Delivering effective science communication: advice from a professional science communicator. *Seminars in Cell & Developmental Biology*, *70*, 10–16. https://doi.org/10.1016/j.semcdb.2017.04.002

Jodén, H., & Strandell, J. (2022). Building viewer engagement through interaction rituals on Twitch.tv. *Information, Communication & Society*, *25*, 1969–1986. https://doi.org/10.1080/1369118x.2021.1913211

Kaiser, P. (2018). Projekt "Plötzlich Wissen" — Raus aus dem Elfenbeinturm, rein in die Kneipe. *Deutschlandfunk Kultur*. https://www.deutschlandfunkkultur.de/projekt-ploetzlich-wissen-raus-aus-dem-elfenbeinturm-rein-100.html

Kaul, L., Schrögel, P., & Humm, C. (2020). Environmental science communication for a young audience: a case study on the #EarthOvershootDay campaign on YouTube. *Frontiers in Communication*, *5*. https://doi.org/10.3389/fcomm.2020.601177

Kristandl, G. (2021). "All the world's a stage" – the Open Broadcaster Software (OBS) as enabling technology to overcome restrictions in online teaching. *Compass: Journal of Learning and Teaching in Higher Education*, *14*, 2. https://doi.org/10.21100/compass.v14i2.1241

Kröger, T., & Nupponen, A.-M. (2019). Puppet as a pedagogical tool: a literature review. *International Electronic Journal of Elementary Education*, *11*, 393–401. https://iejee.com/index.php/IEJEE/article/view/688

Lee, J. (2017). Science communication events in Korea. *Wissenschafts Kommunikation*. https://www.wissenschaftskommunikation.de/science-communication-events-in-korea-5079/

Navarro, A., & Tapiador, F. J. (2023). Twitch as a privileged locus to analyze young people's attitudes in the climate change debate: a quantitative analysis. *Humanities and Social Sciences Communications*, *10*, 1–13. https://doi.org/10.1057/s41599-023-02377-4

Navid, E. L., & Einsiedel, E. F. (2012). Synthetic biology in the Science Café: what have we learned about public engagement? *JCOM*, *11*, A02. https://doi.org/10.22323/2.11040202

Ocobock, C., & Hawley, P. (2020). Science on tap: effective public engagement or preaching to the choir? *JCOM*, *19*, A04. https://doi.org/10.22323/2.19010204

O'Connell, K., Keys, B., & Storksdieck, M. (2018). *Getting to know guerilla science participants: evaluating unexpected and unusual science encounters*. https://doi.org/10.5399/osu/1129

Potgieter, A., McCabe, R. V., & Potgieter, M. J. (2018). The use of hand puppets to increase intrinsic motivation during science learning of 6th and 7th grade learners in Dikgale, Limpopo province, South Africa: a case study. *International Journal of Educational Development in Africa*, *4*. https://doi.org/10.25159/2312-3540/4507

Rosin, M., Wong, J., O'Connell, K., Storksdieck, M., & Keys, B. (2021). Guerilla science: mixing science with art, music and play in unusual settings. *Leonardo*, *54*, 191–195. https://doi.org/10.1162/leon_a_01793

Science Centre Singapore. (2025). *Competition in Singapore — Singapore science buskers at science centre*. Retrieved September 24, 2025, from https://www.science.edu.sg/whats-on/competitions/singapore-science-buskers

Science Made Simple Ltd. (2025). *Science on the street: engaging a passing audience*. Retrieved September 24, 2025, from https://sciencemadesimple.co.uk/item/science-on-the-street-engaging-a-passing-audience/

Stofer, K. A., Rujimora, J., Sblendorio, D., Duqueney, E., Tatineni, M., & Gaudier, G. (2019). Casual conversations in everyday spaces can promote high public engagement with science. *International Journal of Science Education, Part B*, *9*, 296–311. https://doi.org/10.1080/21548455.2019.1670882

Stuebing, M. (2023, March 27). *Bei Gaming-Livestreams und Let's Plays schalten täglich Millionen Menschen in Deutschland ein*. https://www.game.de/bei-gaming-livestreams-und-lets-plays-schalten-taeglich-millionen-menschen-in-deutschland-ein/

The German games industry association. (2024). *Annual report of the german games industry 2024*. https://www.game.de/en/publications/annual-report-of-the-german-games-industry-2024/

Voulgari, I. (2020). Digital games for science learning and scientific literacy. In M. Giannakos (Ed.), *Non-formal and informal science learning in the ICT era* (pp. 35–49). Springer. https://doi.org/10.1007/978-981-15-6747-6_3

Wissenschaft Im Dialog. (2019). *Science Barometer 2016 Wissenschaftsbarometer 2016 — Repräsentative Bevölkerungsumfrage zu Wissenschaft und Forschung in Deutschland* (Version 1.0.0 dataset. GESIS data archive). https://doi.org/10.4232/1.13239

Wood, N. (2017). The engaging world of periscope: live-streaming science to the masses. *Fisheries*, *42*, 185–186. https://doi.org/10.1080/03632415.2017.1294900

About the authors

Julia Schnetzer, PhD, is a marine microbiologist and science communicator. She employs a wide range of communication formats, including exhibitions, television, podcasts, books, public lectures, and live streaming, to inform and educate the general public about marine ecosystems, the ocean's hidden wonders, and the scientific research that underpins our understanding of them.

jschnetzer@gmail.com

André Lampe is PostDoc at the Advanced Medical BIOimaging core facility (AMBIO) of Charité — Universitätsmedizin Berlin and working for the CRC TRR 348 IN-CODE. His reasearch is focused on developing super-resolution flourescence microscopy techniques and research data management (RDM) workflows for light-microscopy core facilities. He also works as a freelancer in science communication and as a lecturer for TU Berlin, TiHo Hannover amongst others. There he teaches presentation techniques, poster design, pictorial language of science communication and RDM. His communication focus is Live-Streaming and the project "Plötzlich Wissen!".

kontakt@andre-lampe.de

Inga Marie Ramcke is a science communicator. She writes non-fiction childrens books for publishers in Germany, uses puppetry to engage audiences and is interested in bridging storytelling, puppetry, science and education. She is pursuing a PhD at the Europa-University of Flensburg puppetry in education and storytelling.

info@ingamarieramcke.de

Kerstin Kremer is a professor of Biology Education at Justus Liebig University Giessen (Germany). She is interested in the Nature of Science and Inquiry-Based Learning, science communication and the transfer of scientific knowledge to broader audiences, including students and educators. She is also involved in Education for Sustainable Development (ESD), aiming to integrate sustainability into educational practices.

kerstin.kremer@uni-giessen.de

Philipp Schrögel is a visiting scholar at Chemnitz University of Technology and the Bonn Lab for Analog Games and Imaginative Play. He also works as a freelancer in science communication. His research and practical work focus on creative and participatory forms of science communication with the aim of making science more accessible. Examples are science slams, comics, games, and the project "home match for science" in rural areas. He also coordinated the development of comprehensive guidelines for participation in research.

philipp.schroegel@hsw.tu-chemnitz.de @schroep.bsky.social

How to cite

Schnetzer, J., Lampe, A., Ramcke, I. M., Kremer, K. and Schrögel, P. (2026). 'Three scientists walk into a bar… Approaching new audiences for informal science communication: the project "Plötzlich Wissen!" (Sudden Knowledge!)'. *JCOM* 25(02), N04. https://doi.org/10.22323/167320251230124543.

ISSN 1824-2049. Published by SISSA Medialab. jcom.sissa.it