



Research Report **windfo**

Germany's scientific output is massive – but how much of it reaches the public? In a time dominated by social media and increasing misinformation, effective science communication is more crucial than ever. Our research group windfo, part of TUMJA #class24, explored how scientists can use short-form videos to communicate complex topics like wind energy – efficiently and credibly. The results are clear: Authenticity beats perfection, AI can ease production, and it's time for researchers to step into the spotlight.

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Preface by the Supervisor

Prof. Dr. Gisela Detrell



The windfo project addresses a highly complex and highly relevant question of our time: How can scientific information be shared on social media in ways that preserve credibility and promote learning? In an environment increasingly shaped by artificial intelligence, the team explored how different forms of content production – human-generated versus AI-generated – impact trust, attention, and information retention.

The students designed and conducted a comprehensive experiment, creating a series of short informational videos about wind energy. Each video varied in key aspects such as speaker type (human vs. AI), presentation style (lecture, interview, explainer), and visual design (real footage vs. AI imagery). Specific misinformation elements were deliberately embedded to assess participants' critical evaluation skills.

By collecting and analyzing data from over 400 participants, Team windfo provided valuable insights into how format and production choices influence audience perceptions. Their results show that while AI-generated visuals can be well accepted, human voices and visible presenters significantly enhance trust in the conveyed information.

Throughout the entire process, the team demonstrated a high level of independence, creativity, and professionalism. It was a pleasure to meet them in person at the very beginning, when the project idea was still evolving, and now, reading their final report, it is really impressive to see how far they have come.

I am confident that they have not only gained valuable insights into the impact of AI-generated versus human-created content but have also developed essential skills in conducting methodical research, working collaboratively, and overcoming challenges.

Congratulations on your outstanding achievement, and all the best for your future endeavors! ■

Supervisor Insights

What is your research interest or motivation for science?

I am fascinated by the challenge of enabling sustainable human presence in extreme environments, such as space. My motivation is to develop innovative technologies that not only advance human exploration but also have tangible benefits for life on Earth.

What special experience from your studies/career would you like to share with the scholars?

During my career, I have often experienced that the most valuable ideas came from interdisciplinary teamwork. I encourage young researchers to stay open-minded and collaborate beyond the boundaries of their specific fields.

Between Lab Coat and Like Button

Why Scientists Should Embrace Social Media

Germany is home to more than 430.000 researchers, who in 2020 published over 174.000 scientific papers to document and share their recent advances, from natural to social sciences. However, listening to socio-political debates with friends or even family or – even more striking – scrolling through comment sections on Social Media might cause one to wonder whether all that research has ever reached the general public in the last twenty years or more.

But instead of simply repeating what is known, it is time to change something. That is why we want to appeal to scientists and researchers from all fields and disciplines: Communicate your work – and be more courageous doing so!

Now, before you stop reading, telling yourself that you do not have the time or money, let us address the elephant in the room: Yes, high-quality science communication requires time and effort – two resources not known to be abundant among university employees – and it is not necessarily easy to fit in between doing the actual research, teaching obligations and administrative duties.

Nonetheless, we argue that maintaining a social media presence and allocating resources to science communication, even in a rather basic format, is a crucial step towards increasing knowledge among the public and regaining trust in science and in a democracy that every scientist should consider themselves to be a part of.

Sure, many fields of science require a high level of in-depth knowledge for one to even begin to understand recent breakthroughs, let alone their implications and relevance. There may also be fields

of research that are less relevant to the primary issues we currently face in the world. Nevertheless, the amount of misinformation that plagues our public discourse is astonishingly high – from climate denial to revisionist history – and a high number of people are still falling for it. In the long run, this will put our democratic system at risk, as can already be seen by the recent developments across the Atlantic, but also right here in Germany, where non-issues have been blown up to looming threats, causing a shift in the priorities that are set on the political agenda.

As part of TUMJA #class24, we, as the research group windfo, spent the last 20 months researching how science communication on Social Media can be done in a way that not only retains a high level of trust and interest among viewers but is also efficient to produce for scientists. Due to the rise in popularity of apps like TikTok, we have focused on short-form video content in particular, creating eight different videos on the exemplary topic of wind energy ourselves and analyzing how they are perceived by a general audience.

Our analysis shows a clear result: Scientists should be more courageous in producing social media videos! Our research shows that fully human-made videos perform only slightly better than AI-generated or AI-voice-over videos in terms of trust and retention. This suggests that AI can significantly reduce the workload for scientists without compromising effectiveness. By using AI tools for scripting, voiceovers, or even basic video editing, researchers can focus on delivering high-quality content without investing excessive time in production, making science communication more accessible and scalable.

At the same time, comprehension is not significantly affected by the choice of video format. However, specific formats, such as self-interviews (a comedic style of video in which one person acts as both ends of a conversation) and real imagery of places and events that is not AI-generated, enhance trust and engagement, while simply reading information aloud does not have the desired effect. Scientists do not need to worry excessively about perfect production quality – authenticity matters more. Researchers can effectively communicate their findings by incorporating relatable and visually engaging formats while retaining audience trust.

Sharing knowledge on social media can foster a more informed society. People who consume science-based content are more likely to make educated decisions in their daily lives, whether in areas such as health, energy consumption, or environmental protection. As Christian Drosten once noted in a podcast episode of *Jung & Naiv*, “You can't spend 20 years doing taxpayer-funded research and then just back out when things get tough” (“Virologe Christian Drosten über die Lehren aus der Pandemie – Jung & Naiv” (2025, März 5): Folge 744. YouTube. <https://www.youtube.com/watch?v=av2Hax3Bg1U>, at 15:45 mins, translated from German)) Contributing to public discourse through social media can be seen as a modern extension of this duty, ensuring that scientific insights reach beyond academic circles and influence meaningful change.

Social media is increasingly used for information, not just entertainment. Scientists do not need to be afraid of producing self-made videos. When incorporating personal presence and real imagery and utilizing quicker cuts, audiences enjoy the content, comprehend it, and retain the information better. While publishing research



in journals remains essential, communicating findings to the general public helps bridge the gap between science and society. In an era where misinformation spreads rapidly, actively engaging in science communication can empower people to make more informed decisions and strengthen democratic discourse, and should thus not be neglected by researchers. ■

Research Report – windfo

Science Communication on Social Media: Scientists should be more courageous!

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Abstract

Social media offers valuable opportunities for public engagement and enables interaction between scientists and the general public. Our research project “windfo” investigates how different types of short videos influence trust, liking, comprehensibility, and retention in the context of science communication about wind energy. The study was conducted using an online survey that included one video and corresponding questions addressing the target variables. The videos varied in elements such as clipping speed and whether the content was AI-generated. While AI-generated videos offer efficiency, human elements were associated with higher levels of trust. Liking and retention were significantly influenced by gender and age, whereas comprehensibility did not differ significantly between conditions. Certain limitations, such as the controlled study setting and topic-specific variability, must be acknowledged. Nevertheless, the results suggest that valuable science communication content can be created for social media without needing to overemphasize specific video formats.

1. Introduction

“Nothing in science has any value to society if it is not communicated.” Despite being said by Anne Roe in 1952, this quote remains highly relevant to this day. Today, social media plays a major role in shaping public discourse, with platforms like X, Instagram, and Facebook generating millions of interactions per minute (Statista 2025a, 2025b). Nearly 80% of Germans use social networks actively, making these platforms powerful channels for science communication.

Social media, according to *apomediation theory*, allows direct, unmediated interaction between scientists and the public (O'Connor 2013; Regenber 2019). However, this benefit can also pose challenges: content shared briefly and without context can lead to misinterpretations (Roland et al. 2015), and the spread of misinformation or “fake news” remains a serious concern (Majerczak & Strzelecki 2022).

Generative AI adds to this complexity. While it enables faster content creation, it also raises concerns about authenticity, accuracy,

cy, and transparency—essential values in science communication (Open Science Future 2024). Studies suggest that better explainability and accountability in AI can foster trust, but this depends on how well communicators are trained to use these tools (Shin et al. 2022).

Despite increasing use of digital media, users still lack adequate media literacy and resistance to misinformation (Majerczak & Strzelecki 2022; Trninić et al. 2022). However, there is limited research on what influences trust and awareness in science-related content on social media.

To address this gap, we conducted an experiment to measure how different video formats affect the viewer's liking, trust, comprehension and retention. We created eight social-media-style informational videos on wind power, each varying by one key feature, while keeping other variables constant. Wind power was chosen as an exemplary topic due to its relevance and controversy in Bavaria (Clean Energy Wire 2023), and each video intentionally included three pieces of misinformation to test audience comprehension.

The videos produced in German to reach a broad Bavarian demographic, were assessed via a digital survey. Our goal was to identify which formats best support effective science communication and to provide practical guidelines for researchers aiming to use social video content in their outreach.

We focused on four core criteria: liking (personal enjoyment of the video), trust (perceived reliability of the content or presenter), comprehension (understanding of the messages within the video), and retention (how well viewers remember the content). Attention was also key, as engagement is essential for effective information transfer. By analyzing audience responses across demographics and video types, we hope to inform better practices for using social media in science communication.

Based on the theoretical framework and prior research, we propose the following hypotheses:

Trustworthiness Hypotheses: We hypothesize that perceptions of trustworthiness vary depending on the video format and the source of the visual and auditory content. Specifically, we expect that AI-generated visuals and voice-overs will be perceived as less trustworthy than human-generated visuals and voices. Additionally, we hypothesize that the format and degree of editing will influence perceived trustworthiness.

Retention Hypotheses: We further hypothesize that information retention is influenced by the source of the video and voice production, as well as by the video format. We hypothesize that retention scores are higher for human-generated videos compared to AI-generated ones. Specifically, we compared visuals and audio.

Liking and Trust were only compared between the different video styles to see whether any significant differences would arise between them.

Influencing Variables Hypothesis:

We hypothesize that individual differences, particularly age, gender, and amount of social media usage, will moderate the effects of video format and content production method on perceived trustworthiness and retention.

Research Objective: By testing these hypotheses, we aim to assess the extent to which trustworthiness and information retention are affected by variations in the presentation format, production method (AI vs. human), visual editing, and language style in short videos discussing the topic of wind power.

2. Materials & Methods

2.1 Study design

The following sections provide an in-depth description of the videos and the survey developed during our research. This study employs a quantitative, cross-sectional, and retrospective design to analyze participants' perceptions of trustworthiness and information retention. Data were collected through a structured survey, with questions before and after one of our eight videos being shown to the participants.

2.1.1 The Videos

Before filming, we prepared a script. We used the script uniformly across all videos to minimize variations in perception caused by differences in wording, with an exception for video 2 (Self-interview), due to its different setup (two people talking to each other). The full script can be found here: tiny.cc/windfo-script.

We designed the script to be informational, educational, and short (90 seconds), due to most social media platforms' limitations on video length (most commonly 60 or 90 seconds). It presents relevant facts about wind power plants and their challenges clearly and concisely. As mentioned above, we deliberately embedded three pieces of misinformation in our script, to analyze trustworthiness. All of the videos can be found at tiny.cc/windfo-videos.

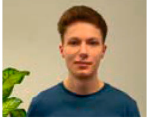
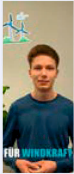
2.1.2 The Constants

We tried to keep as many constants as possible throughout the videos to avoid unexpected external variables, e.g. differences in clothing. The constants between the videos are the following:

- **Script:** All videos use the same wording and content, except for video 2 (Self-interview), as presented above.
- **Duration:** All videos are between 80 and 90 seconds long, as is standard for social media.
- **Speaker:** The same individual appears in all videos where a person is visible.
- **Format:** All videos are in portrait orientation, as is standard for social media.
- **Wardrobe:** The speaker wears a dark-blue long-sleeve top.
- **Voice:** The speaker maintains a similar speed, tone, and enthusiasm across all videos.
- **Equipment:** All videos use the camera model Sony Alpha 6400 and microphone model RØDE Wireless Go, except for videos 6, 7 and 8, for which the visuals (7, 8) and audio (6, 8) were generated by GenmoAI and Invideo.

2.1.3 The Variables

	Location	Style	Interaction with audience	Audio	Editing	Filming	Notes
Video 1 Lecture 	In front of a board inside the lecture hall	Speaker talks to the students in front of them, camera image starting from the waist up including the arms, relatively static picture	Speaks indirectly into the camera; looks at students instead of at the camera	Live, from speaker	Minimal, no/ few cuts, no overlaid text/ graphics	Medium shot portrait format	Low effort filming, clear monologue, no extra add-ons
Video 2 Interview 	Calm background on a sofa in an office, some plants in the background	Two characters (same person, dressed slightly differently) talk to each other in a dialogue, only one character is seen at a time. Shot switches between characters as they talk	Speakers do not talk/look directly into the camera; their attention is on the other person	Live, from speakers	Cuts between the two people so they are in frame whenever they speak, no visual overlays	At 45° and each person constantly either left or right side → medium close-up	Higher effort, more editing, two parts of the dialogue need to be filmed separately in different angles

	Location	Style	Interaction with audience	Audio	Editing	Filming	Notes
Video 3 Explainer 	Office, plain background, a plant for decoration	Speaker talks directly into camera, plain monologue	Speaker talks to audience, hand gestures, plain monologue	Live, from speaker	Minimal, few cuts, no overlaid text or graphics	Medium shot	Some space is intentionally left to add graphics and text in video 4
Video 4 Explainer with visuals 	Identical to video 3	Identical to video 3 + overlaid text and graphics for visual support	Identical to video 3	Identical to video 3	Overlaid text and graphics have to be edited in for visual support	Identical to video 3	Video 4 is made with the footage of video 3 + overlaid text and graphics
Video 5 Human / Human 	Wind Power plant, solar panel plant, nature, outdoors	Documentary style: Filmed footage and different shots (no AI-generated footage), no speaker visible, maybe some animations	Speaker talks to the audience, but is not visible	Human voice-over (recorded, not AI-generated)	Different shots need to be edited together, text overlays and graphics where useful	Several shots and footage of wind power plants, workers, solar panels, birds, motors	A documentary style video, high effort, different shots need to be filmed and edited
Video 6 Human / AI 	Identical to video 5	Identical to video 5	Identical to video 5	AI-generated voice-over	Identical to video 5	Identical to video 5	Video 5 with AI voice-over instead of human voice-over
Video 7 AI / Human 	-	Documentary style, only AI-generated imagery, no live video, no speaker visible	Speaker talks to audience, but is not visible	Human voice-over (recorded, not AI generated)	AI-generated changing imagery	No filming needed (AI)	Low effort, AI creates and edits most of the footage
Video 8 AI / AI 	-	Identical to video 7	Identical to video 7	AI-generated voice-over	Identical to video 7	Identical to video 7	Video 7 with AI voice-over instead of human voice-over

2.1.4 The Filming Process

The filming took place over two days. On day one, we recorded videos 1-4 at the TUMJA office and an empty lecture hall at TUM. On day two, we traveled to Denklingen Windpark to film videos 6 and 7 in various locations.

2.1.5 The Survey

We created the survey to measure our four evaluation criteria, liking, trust, comprehension and retention, across our different videos and different demographics of the participants and to answer our initial hypotheses. Like the videos, the survey was conducted in German and took around seven minutes to complete, including watching the 90-second video.

To measure the evaluation criteria of the videos, we embedded one of our videos in the middle of the survey for our participants to watch and then answer questions about their perception of the video. We used an algorithm that randomly selected one of the eight videos for each participant.

The survey, was structured in three parts:

1. Part one was designed to determine **decisive demographics**, e.g. gender, age, and education, as well as the participant's usage of and attitude towards social media.
2. Part two included the randomly selected video as well as some general questions about its **perception**, regarding e.g. video speed, familiarity with the topic, and clarity of contents.
3. Part three measured the three **evaluation criteria** with Yes/No questions, such as "I believe the information conveyed to be factually correct," "I was attentive following the video during this survey" and questions about the content of the video, e.g. "How much renewable energy is Germany set out to produce in 2030?".

The survey included different types of questions, all designed to enable a quantitative analysis. These included categorical questions, such as selecting an educational degree, and Likert scale questions, where participants rated statements (e.g., "I was attentive following the video during this survey") on a scale from 1 (not attentive) to 5 (very attentive).

The entire questionnaire can be found here: tiny.cc/windfo-questions.

2.2 Data Collection

We collected data from 10th of November to 17th of December 2024. The survey participants were acquired via:

- Sharing the survey link online through social platforms including LinkedIn, WhatsApp, direct messages, mailing lists, and Instagram stories.
- Street surveys, where we asked people in public places to scan a QR code and complete the survey.
- Instagram Ads, played by the @tum.jungeakademie account:
- The first ad reached 31,958 accounts and led to 458 clicks on the survey
- The second ad reached 22,667 accounts and led to 546 clicks on the survey
- The ads ran from the 30th of November to the 16th of December



It is worth noting that women were more likely to participate in the street survey than men, which corresponds with the research of W.G. Smith (2008), who found that while women were more likely to participate in surveys, yet there was no gender bias.

Data collection was conducted under GDPR compliance, as agreed to by the participants of the survey.

2.4 Timeline

Fig.1 shows our research timeline. It can be broken down into three phases: The planning and research phase, the execution phase, and the analysis phase. The planning and research phase from March 2024 to June 2024 included all the literature research we did before starting our project as well as detailed planning of the

filming process and data collection. We began the execution phase at the end of June 2024 with workshops on video scripting, filming, and cutting. All videos were finalized in August 2024. The data collection occurred from October to December 2024. This included sharing our survey through online platforms, street surveys and Instagram ads. We began the analysis phase in 2025. This included the data analysis and discussion as well as the development of our social media guidelines for scientists.

Comprehensibility was assessed by the people subjectively answering on how easy the video was to understand in terms of talking speed, the content of the video in general and the wording. The variable trust was measured by questions on perceived trustworthiness towards the speaker and the video itself on a scale from one to four. Retention was measured by a small multiple-choice test within the survey, containing five questions on the videos' content. The last latent variable that we assessed was how much people liked

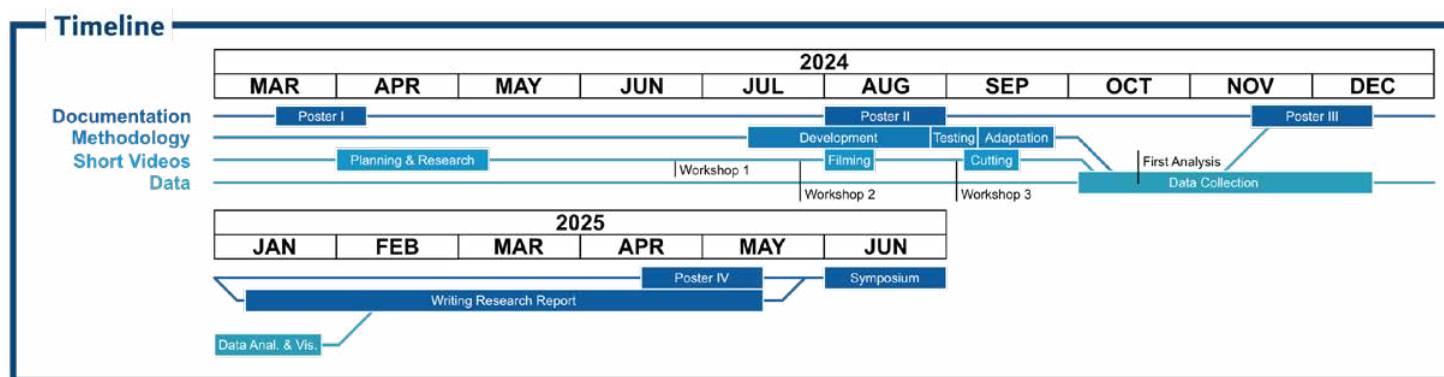


Fig.1 Research Timeline of the windfo project

2.5 Analysis

As is common practice to estimate the sample size, a G*Power analysis was conducted for a multi-factor ANOVA using a medium effect size, an alpha level of 0.05, and a power of 0.80, following standard guidelines (Cohen, 1988). Our data collection achieved the required total sample size of 400 participants, with 50 per group, as indicated by the G*Power analysis.

We conducted the data analysis using the statistical software R Studio. Observations are uncorrelated by the cross-sectional study design via a survey. The normal distribution assumption for the underlying datasets was assumed as sample size for groups were > 35 . We ensured homoscedasticity using the Levene-test. After initial descriptive statistics, we analyzed the four major constructs: comprehensibility, trust, retention and liking of the video. These latent variables were assessed by the test person's subjective survey response to certain questions.

the video by asking how the people liked the video style, the topic, and whether they would want to watch videos like this in the future.

The hypothesis on a different predictive value of the videos on trust, retention, liking and comprehensibility were analyzed with a multiple ANOVA, while controlling for quantity of Social Media usage, age and gender. Additionally, differences between human and AI-generated video and voice were assessed by a one-tailed t-test, suggesting that trust, retention, liking, and comprehensibility are higher for human creations. To identify differences in the latent variables between videos, we conducted post-hoc tests after Tukey's HSD and corrections by Bonferroni-Holm. In the present analysis, participants who identified as diverse ($N = 9$) were excluded from tests on gender differences due to the small sample size. Given the limited number of cases, meaningful statistical comparisons could not be conducted, as small groups can lead to violations of statistical assumptions and reduced statistical power.

3. Results

3.1 Study Population

The 441 participants in the final sample had a mean age of 34.69 years (SD = 14.86). The age distribution can be found in Fig.2. 274 out of the total sample size were female, 158 male, and 9 diverse.

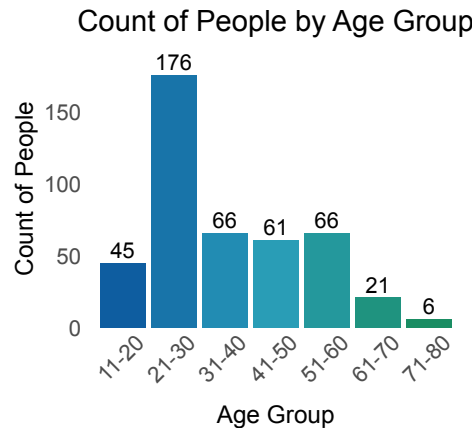


Fig. 2 Count of People by Age Group

All videos had 55 or 56 views.

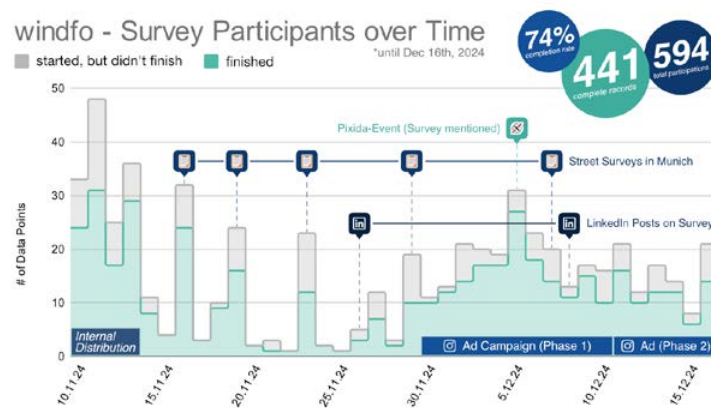


Fig. 3 Survey Participation over time

3.2 Trust

A two-way analysis of variance (ANOVA) was conducted to examine the effects of video type, age, and gender on Trust.

The analysis revealed a significant main effect of video type on trust ($F(7, 176) = 3.099, p = 0.004, \eta^2 = 0.11$). Post-hoc tests after Tukey's HSD showed significant differences for trust by video type for video 2 and 6 ($p = 0.035, d = 0.42$), 2 and 8 ($p = 0.01, d = 0.49$), 5 and 8 ($p = 0.03, d = 0.51$). No significant main effect between male and female gender on trust was found. Additionally, age did not show a significant main effect on trust. No significant interaction effects were observed.

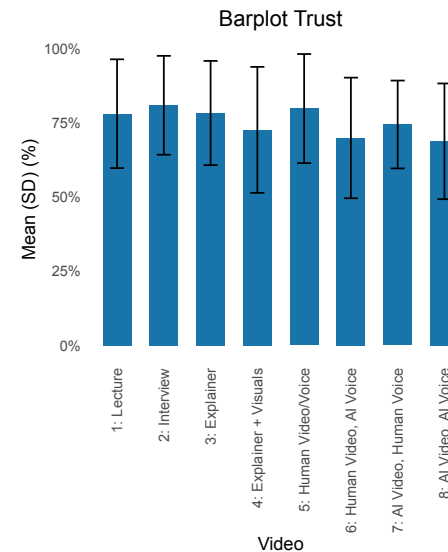


Fig. 4 Effects of Video Type on Trust

Additionally, we performed an analysis for differences in human or AI created material on trust scores. The t-test comparing AI Video (7 and 8) to Human Video (5 and 6) showed no significant difference in trust scores ($p = 0.19$). The t-test comparing AI Voice (6 and 8) to Human Voice (5 and 7) showed a significant difference in trust scores ($p < 0.01$) with Human Voice having a higher mean trust score.

3.3 Liking

A two-way ANOVA was conducted to assess the impact of video type, age, and gender on liking. The results showed no significant main effect of video type. However, there was a significant main effect of gender on liking ($F(2, 176) = 3.262, p = 0.041, \eta^2 = 0.04$). The post-hoc test by Bonferroni-Holm showed a significant difference for liking between male and female subjects ($p = 0.028, d = 0.26$).

Furthermore, a significant main effect of age on liking was found ($F(6, 176) = 2.284, p = 0.038, \eta^2 = 0.07$). No significant effects by age on liking were found in direct group comparisons with Tukey's HSD.

No significant interaction effects were observed.

3.4 Comprehensibility

The ANOVA for Comprehensibility did not yield any significant main effects or interaction effects.

3.5 Retention

A two-way ANOVA was performed to investigate the influence of video type, gender, and age on retention. The results indicated no significant main effect of video type. However, there was a significant main effect of gender ($F(2, 176) = 4.697, p = 0.010, \eta^2 = 0.05$). Post-hoc test with correction after Bonferroni-Holm showed a higher retention score for male participants ($p = 0.01, d = 0.29$).

Additionally, age showed a significant main effect, $F(6, 176) = 2.829, p = 0.012, \eta^2 = 0.09$. Post-Hoc tests with correction by Tukey's HSD revealed a significant difference for the age groups 21-30 and 61-80 ($p = 0.01, d = 0.32$). Other comparisons between age groups were not statistically significant ($p > 0.05$).

No significant interaction effects were found.

Additionally, we performed an analysis for differences in human or AI-created material on retention scores. The Welch Two Sample t-test comparing AI Video (7 and 8) to Human Video (5 and 6) showed no significant difference in retention scores ($p = 0.4305$). The Welch Two Sample t-test comparing AI Voice (6 and 8) to Human Voice (5 and 7) showed no significant difference in retention scores ($p = 0.55$).

4. Discussion

In the following sections, we examine our study's findings based on these criteria. Our study analyzed video formats commonly found on social media to ensure our results translate to practical recommendations for researchers producing scientific videos. Additionally, we evaluate how viewer characteristics, such as gender and age, influence the audience's experience and perception of the videos.

4.1 Trust

Our ANOVA analysis indicates that **video type** – the format through which content is presented – significantly influences viewers' trust in the video. While the effect on **trustworthiness** is moderate, the choice of video format remains crucial. **Gender** also has a significant impact on trust ratings, with an effect size comparable to that of video type. However, no interaction effect was found, meaning that the influence of video type on trust is independent of age and gender, and vice versa.

To compare individual videos, **Cohen's d** was used to measure effect size. **Video 2 (Self-Interview)** was rated as significantly more trustworthy than **Video 6 (Real Imagery + AI Voice)** and **Video 8 (AI Imagery + AI Voice)**. This suggests that videos featuring a real person speaking in an interview format foster greater trust than those relying on AI-generated content. Consistent with previous research (Buchanan & Hickman, 2024), our findings indicate that people generally trust human-made content more. Additionally, **Video 6 (Real Imagery + AI Voice)** was rated as significantly more trustworthy than **Video 8 (AI Imagery + AI Voice)**, reinforcing the idea that an increased presence of AI reduces perceived trustworthiness.

Interestingly, no significant difference in trust was observed when comparing **Video 5 (Real Imagery + Human Voice)** with AI-enhanced videos. Nevertheless, across all comparisons, videos incorporating AI received lower trust ratings overall. These findings suggest that using **real imagery, voices, or human presenters** is more effective in fostering trust. One possible explanation is that natural human voices may be perceived as more credible, relatable, and engaging than synthetic AI-generated voices.

While AI-generated content is a practical solution when resources are limited, these results suggest that incorporating human elements where possible enhances trustworthiness.

4.2 Liking

The next criterion, liking, had a much smaller impact on how much people enjoyed watching the video presented. But when comparing differences between genders, women, on average, rated the videos lower in terms of liking than men. It should be noted that the presenter in the videos with a person in front of the camera was a man in his twenties. This may influence the relatability between the viewer and presenter – an implicit bias that has often been observed in the literature, where older people are perceived more knowledgeable and competent than their younger counterparts (Nath et al., 2006). Additionally, it is possible that women answered the questions more critically and were more engaged in providing good feedback for the survey.

4.3 Comprehension

The video format did not significantly impact how people comprehend the presented information. Additionally, the demographic characteristics of the viewer did not affect the amount of knowledge gained either. This suggests that all video formats were equally effective in delivering comprehensible information, meaning AI-generated and human-produced videos worked similarly well from an educational perspective. Since the information was shared with a similar text in all videos, it is possible that a different type of text would have impacted comprehension. The text was written in a way that avoids complicated sentences and tries to simplify complex content, without oversimplifying (and potentially misrepresenting) causal connections. This seems to be more important than the way of presenting the information.

4.4 Retention

The retention of the viewer was tested by deliberately including wrong facts in the videos. This was done to prevent the audience from using prior knowledge in answering the follow-up survey questions. The video format did not influence how much information participants retained. This suggests that AI-generated videos can be as effective as traditional human-led formats for memory retention. Like the differences in the liking criteria, women, on average, retained less information than men. The difference is small but might support a societal difference in ascribed or actual knowledge of technical topics like wind energy production (Stewart-Williams & Halsey, 2021).

Similar to liking, age affects the retention level. Older participants (61–70) retained more pieces of information than younger ones (21–30) ($p = 0.011$, $d = 0.32$). This suggests that older adults performed better in remembering the content, which could be due to differences in experience and exposure to short-form video formats. Yet, it should be noted that our sample size in data points is a lot smaller for people of the older age group than for younger ones, which might hint towards a statistical outlier. It is also possible that the survey setting impacted this outcome. Older participants might have taken more time, more focus, and a more serious attitude when participating in the survey. Younger participants might not have focused with the same amount of headspace (as might also be more realistic when it comes to using social media platforms in their everyday life).

The analysis revealed no significant effect of video type on Liking, Retention, or Comprehensibility, indicating that AI-generated and human-produced videos perform equally well in terms of cognitive processing. However, trust in AI-generated content varied depending on the type. While AI-generated imagery was generally accepted, AI-generated voices were associated with lower trust ratings compared to human voices.

Additionally, significant effects of gender and age were observed for Liking and Retention. Women reported lower liking scores and exhibited lower retention compared to men. Furthermore, age influenced retention, with participants aged 61–70 demonstrating significantly higher retention than those aged 21–30. These findings suggest that individual differences in demographic factors may impact user engagement and information retention, whereas the production method of the videos does not appear to influence cognitive outcomes.

5. Limitations

Our study highlights a significant opportunity for researchers from different backgrounds to engage with the public more actively through social media platforms. Additionally, we find that artificial intelligence/AI-assisted tools can considerably reduce the effort required to create social media videos, thereby lowering the barrier for researchers to participate in digital science communication, even under time constraints. However, despite these promising

findings, several limitations must be acknowledged and addressed in future research.

5.1 Comparability of Video Formats

A key limitation of our study is related to the comparability of different video formats. Due to the constraints on both the preparation and evaluation phases, we limited our sample to eight distinct video styles. Our selection aimed to balance a broad representation of different video genres with an exploration of nuanced variations within specific formats. The videos we created included direct-to-camera presentations, voiceovers accompanied by stock imagery, and a comedic sketch format. Additionally, we introduced subtle variations within some formats, such as the presence or absence of graphical elements in a direct-to-camera video and the use of AI-generated versus real imagery and voiceovers in stock imagery-based videos.

This methodological compromise—between a broad comparative analysis of different video styles and a detailed examination of minor modifications within specific formats—inevitably constrains the scope of our findings. Future research could either expand the range of video formats to encompass a more comprehensive spectrum of social media content or conduct a more fine-grained analysis of specific stylistic elements to understand their distinct contributions to viewer engagement and comprehension.

Furthermore, our study does not account for potential implicit influences and biases that may arise from variables such as the presenter's gender, age, clothing style, or the background setting of the video. Additionally, slight variations in intonation and articulation might still influence the viewer's perception, despite the same script being used between videos. These factors may significantly impact viewer perceptions and engagement. Addressing these biases in future studies, possibly through controlled experiments or meta-analyses, would provide a more comprehensive understanding of the variables influencing social media science communication effectiveness. Additionally, psychological and sociological factors, such as audience predispositions toward certain presenters or their cognitive biases, could play a significant role in shaping viewer reactions and should be explored further.

5.2 Contextual Limitations: Social Media vs. Controlled Setting

Another limitation of our study relates to the controlled environment in which participants viewed the videos. The videos were presented in an isolated, distraction-free setting via a dedicated website, encouraging (though not guaranteeing) full attention from the participants. However, this setup does not accurately reflect the real-world conditions of social media platforms, where users navigate an environment filled with competing stimuli, including comment sections, notifications, algorithm-driven recommendations, and the ability to skip or scroll away from content instantaneously. Given that social media platforms are designed to maximize user engagement rather than information retention, our findings may not fully translate to actual user behavior on these platforms. Future research should explore how different video styles perform in real-world social media environments, possibly through observational studies or A/B testing within platform algorithms.

Additionally, we did not account for the challenge of gaining visibility and reach on social media platforms. Newly created accounts often struggle to gain traction, and building an audience requires significant effort and time. This challenge is particularly relevant to researchers new to social media, as low engagement on initial posts may discourage continued participation. Investigating the impact of algorithmic promotion, follower engagement, and strategies for increasing visibility could provide valuable insights into the long-term feasibility of social media as a tool for scientific outreach. Moreover, future studies could analyze the impact of different social media platform policies, such as video length constraints, algorithmic preference for specific types of content, and community-driven engagement features, on the effectiveness of scientific communication.

5.3 Selection Bias in Survey Participants

Our recruitment strategy for survey participants primarily relied on paid advertisements on Instagram, outreach in student groups, and direct engagement on the streets of Munich. Consequently, our sample predominantly consisted of young, educated, German-speaking individuals, particularly university students. This demographic homogeneity limits the generalizability of our findings, as different age groups, educational backgrounds, and linguistic communities may engage with social media content in dis-

tinct ways. Future research should seek to include a more diverse participant pool, potentially through stratified sampling methods or targeted outreach efforts, to assess the impact of demographic variables on video reception and engagement.

While certain demographic groups may be underrepresented on social media platforms, particularly older age cohorts, their perspectives remain valuable for understanding the broader societal implications of digital science communication. Researchers should consider whether and how specific audience segments might engage with science-related content, even if they are statistically less active on social media. Additionally, future studies should explore whether differences in educational background influence how individuals interpret scientific information presented in videos. For instance, do individuals with more extensive scientific training engage with and trust the videos differently than those with minimal scientific background?

5.4 Topic-Specific Variability

The subject matter of our videos also represents a potential limitation. We selected wind power as the focal topic due to its ongoing political and societal relevance, particularly in Bavaria. However, different scientific topics vary in their public perception, complexity, and level of controversy. Topics that are highly polarizing or require substantial prior knowledge may elicit different audience reactions than those that are more accessible or widely accepted. The extent to which our findings apply to other areas of science communication – such as health, environmental sustainability, or physics – remains uncertain. Future research should examine how the effectiveness of social media videos varies across disciplines and whether certain presentation styles are more effective for specific fields of study.

Further, the chosen topic may have influenced the engagement levels and biases of survey participants. Given the ongoing debates surrounding wind power, individuals with strong pre-existing opinions on renewable energy may have responded differently than those who were more neutral. Future research could assess whether controversial scientific topics elicit greater engagement but also more polarized reactions, while universally accepted topics may be received with less engagement but greater consensus.

5.5 Future Research Directions

Overall, while our study provides valuable insights into the use of AI-assisted video creation for science communication, several limitations suggest potential for further research. Expanding the range of video formats, investigating implicit biases, testing content in real-world social media environments, diversifying participant demographics, and exploring topic-specific effects are all important next steps. Additionally, more advanced methodologies – such as eye-tracking studies to determine which aspects of a video capture viewers' attention – could provide deeper insights into engagement dynamics. Further, longitudinal studies could assess the long-term impact of different video formats on knowledge retention and public attitudes toward scientific topics.

By addressing these limitations, future research can contribute to a more comprehensive understanding of how scientists can effectively leverage social media for public engagement and science communication. Ultimately, ongoing interdisciplinary collaboration between communication scientists, cognitive psychologists, and social media experts could enhance our understanding of how best to bridge the gap between scientific research and public discourse in the digital age.

6. Conclusion

Our project investigated the importance of trust, comprehension, liking, and retention in science communication on social media platforms. While AI-generated videos offer considerable advantages in terms of production efficiency, the results indicate that human elements – such as a visible speaker and natural voice – significantly enhance perceived trustworthiness. Although AI can produce structured and factually accurate content, audiences express greater trust in human-generated material.

Notably, most video formats did not lead to substantial differences in audience responses regarding comprehension, liking, or retention. However, trust ratings were influenced by video format, with the interactive self-interview receiving the highest levels of trust. Additionally, content featuring AI-generated voices consistently received lower trust ratings. This finding highlights the value of human presence and suggests that authenticity, as conveyed through natural speech, remains difficult for AI to replicate. At the same time,

comprehension and retention scores did not differ significantly between AI- and human-generated content, indicating that AI can support effective science communication when applied thoughtfully.

In addition to content format, demographic factors influenced participants' responses. Older individuals demonstrated higher retention, potentially due to increased focus or prior familiarity with the video topic. Gender differences also emerged, with women reporting lower levels of enjoyment. These findings underscore the importance of accounting for audience diversity in the design of science communication materials and highlight the need for inclusive approaches that resonate across demographic groups.

The study also draws attention to the challenges posed by misinformation in digital environments. By embedding deliberate inaccuracies into the videos, we assessed viewers' ability to detect false information. While some participants were able to identify misleading claims, many struggled to do so—reinforcing the need for improved media literacy and transparent, well-sourced communication.

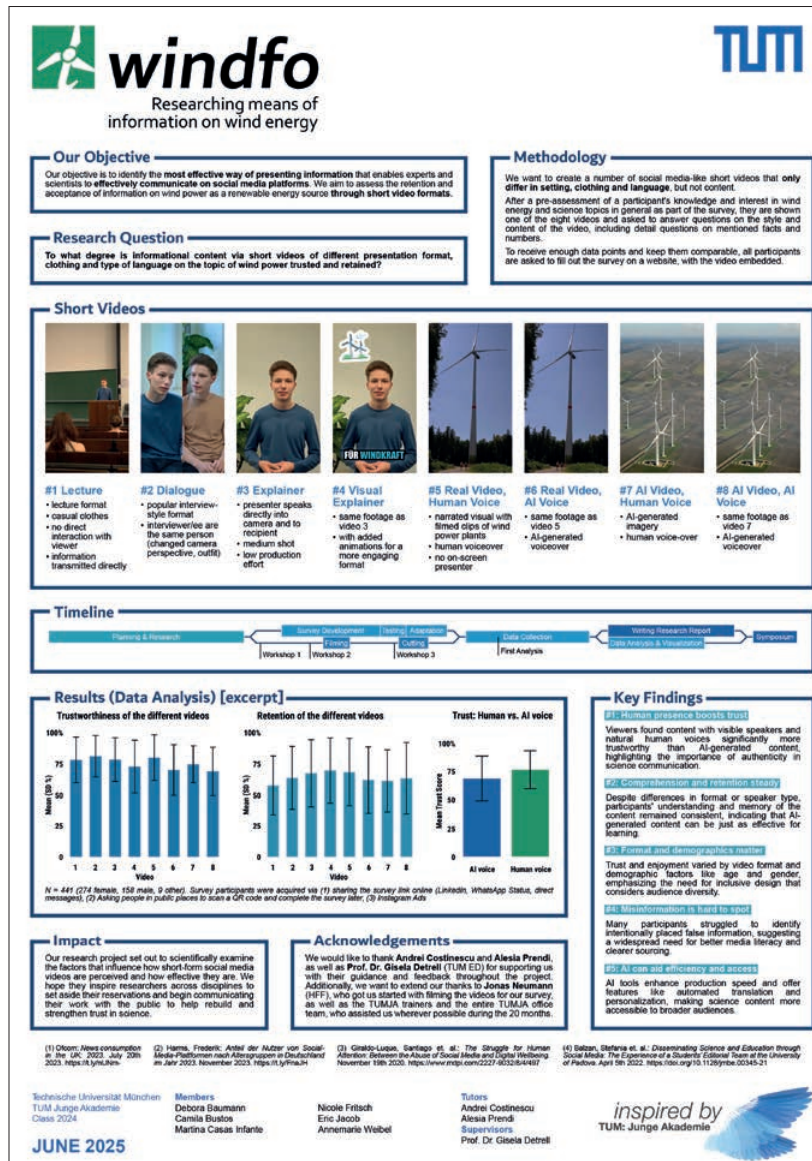
To build on these findings, future research should examine how different formats perform in real-world social media environments. Metrics such as viewing duration, sharing behavior, and user interaction could provide a more comprehensive picture of audience engagement. Moreover, investigating long-term retention could offer insight into the sustained impact of short-form science content. The role of AI in expanding accessibility also presents a promising area for further exploration. Features such as automated translation or personalized content delivery may enhance inclusivity.

In conclusion, our project provides valuable insights into using social media for effective science communication. While AI-generated content offers significant advantages in terms of efficiency and scalability, human contribution remains essential in building trust and engagement. Science communicators must balance AI efficiency and human authenticity to ensure their content is accessible and trusted. By continuing to refine these strategies, researchers and communicators can bridge the gap between scientific knowledge and public understanding, fostering a more informed and scientifically literate society. ■

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Process description



After approximately 4 months of discovery phase, which started off with ideas for improving mental health among hospital patients, continued with brainstorming ideas for tools for effective use of renewable energies, we finally found our topic in science communication. Wanting to retain the aspect of renewable energy, we focused specifically on wind energy.

As we explored science communication, we noticed a lack of researchers sharing their knowledge on social media. Given the prevalence of misinformation and the risk of uninformed decision-making, we recognized the need to identify effective ways of communicating scientific content on these platforms.

For this, we decided to create our own short videos. First, we had to define the variables for our analysis. To keep certain factors constant, we chose Eric as the presenter for all videos requiring a visible person, and we used the same script across formats. We produced a range of video formats, including more engaging styles and others featuring AI-generated imagery or voiceovers.

Afterwards, the social aspect of our research followed: recruiting enough participants for our survey proved challenging. By walking around Munich, reaching out to friends and family, and experimenting with Instagram ads, we ultimately gathered sufficient responses. Our survey assessed each video's attentional impact, perceived trustworthiness, and audience retention. The results show that engaging videos appeal to people, and AI-generated content does not necessarily decrease the quality of the video.

The results reinforce our appeal to scientists: be bold in sharing on social media. We are excited about our findings and plan to create a short guideline for scientists on producing effective videos for social media.



Self-Reflection windfo

How do you carry a project through 20 months of research when your topic changes along the way? That's one of the core questions we've had to face on our journey as team windfo – a team that, in the end, learned to embrace change rather than fear it.

At the beginning of our TUMJA journey, our goal was to explore how the quality of life for patients in retirement homes and hospitals could be improved. It was a topic close to our hearts and seemingly rich in possibilities. But as we dove deeper into the literature, it became increasingly clear that our original question had already been studied quite thoroughly. It was a tough realization, especially after investing time and energy into a direction that suddenly didn't feel meaningful anymore. But in hindsight, it became one of our most valuable lessons: research is not a linear process, and flexibility is essential. Changing our topic mid-way was not a failure – it was the start of truly learning how to do research.

With a new focus came new motivation, but also new challenges. One challenge that consistently reappeared was teamwork. Collaborating in a team sounds easy on paper, but we quickly found ourselves navigating different working styles, preferences, and expectations. At times, balancing everyone's interests required compromise and, occasionally, uncomfortable conversations. Still, this process taught us how to accept and appreciate each other's

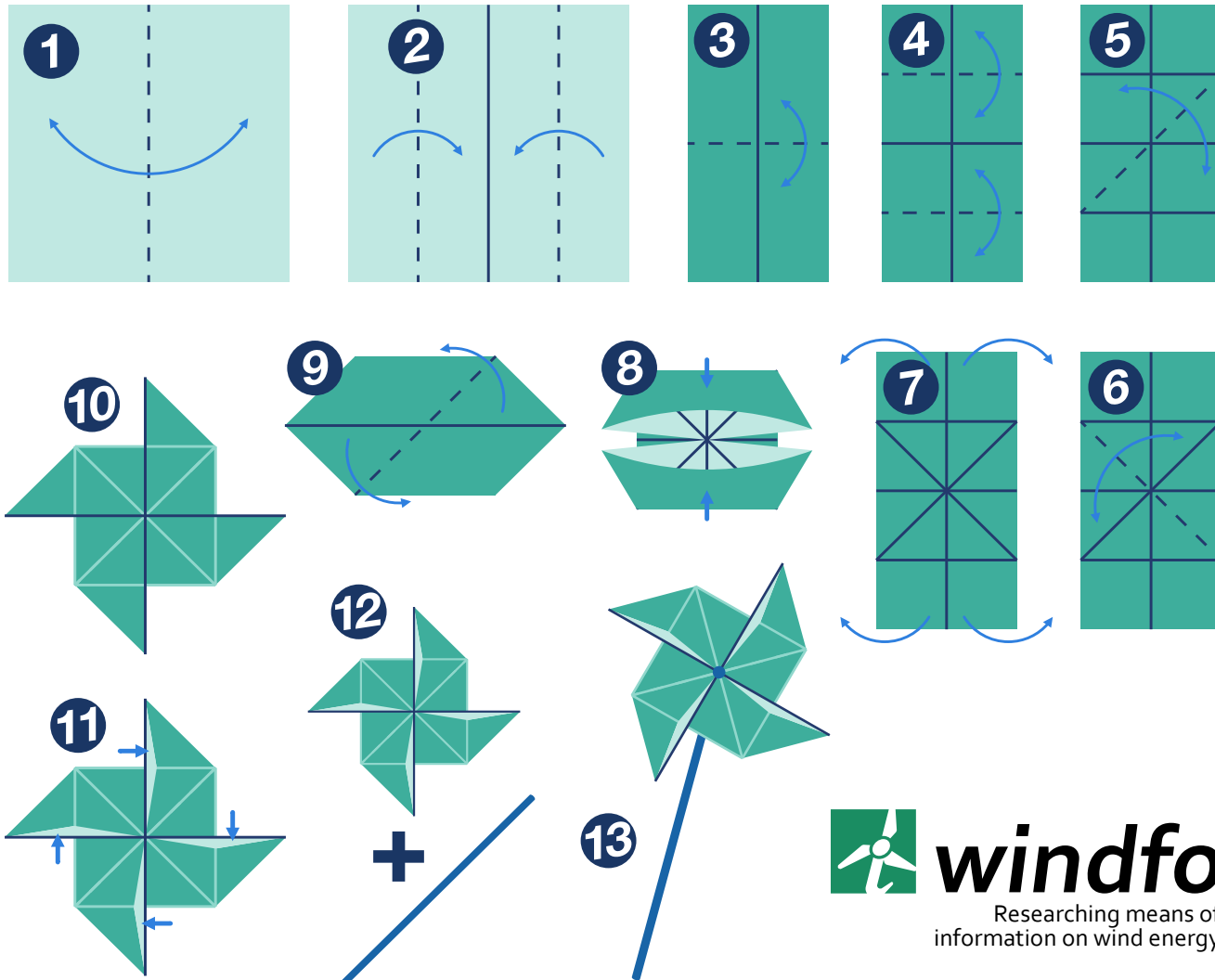
quirks and differences. Learning to work together despite our contrasts made our team more resilient – and more human.

Another lesson we learned early on: a self-organized research project won't move forward unless someone makes the first move. Taking initiative was key. Without structure or deadlines from outside, we had to become our own project managers. It was both liberating and demanding, and we're proud that we managed to keep the momentum going – even if we stumbled along the way.

One area where we, in retrospect, see room for improvement is communication – especially with our supervisors and tutors. While they were always available to support us, we didn't always make enough use of that support. More proactive communication from our side could have helped us get through some of the rougher patches more smoothly. It's a lesson we'll carry forward: don't hesitate to ask, to check in, to stay in touch.

Looking back, we see a team that didn't have all the answers but was willing to ask the right questions. We shifted course, learned to self-organize, found balance in our differences, and understood that research is rarely a straight path. Our journey as windfo was not just about the final results – it was about becoming better researchers, better team players, and more reflective individuals. ■

Make your own Pinwheel



windfo
Researching means of
information on wind energy