Using Data Comics to Communicate Complex Pandemic-Related Information:
A Pilot Workshop With Illustration Students

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Abstract

This article details and analyzes a workshop conducted with MA students in Illustration, Publishing and Printmaking at the University of Porto, Portugal. It explored the articulation of narrative illustration and science communication to render complex, COVID-19-related information accessible to a broader public. The workshop began with a presentation of relevant theories and methodologies in science communication. Students were then invited to respond to three COVID-related briefings on media communication inconsistencies: "Oscillations of the pandemic peak", "On Tuesdays the cases rise!" and "Bad maths!" Methodologically, participants followed a process of ideation, sketching, and refinement: unpacking statistics and public health messaging, and weaving data-driven insights, creative expression, and visual storytelling. The convergence of data and illustration facilitated nuanced interpretations of the pandemic, particularly in respect to the presentation of complex data as a sequential narrative, rather than a single image or chart. The resulting data comics pointed towards an added potential for engaging and informing broader audiences with complex public health information. Six of the workshop outcomes were presented as part of the exhibition "o_U: an exhibition of meme symptoms and side effects", in Porto, Portugal, in March 2024. As a space geared towards a younger clientele, the host venue provided an appropriate context for performing an external validation of the workshop outcomes. The workshop and exhibition are part of the ongoing exploratory project "An Infodemic of Disorientation: communication design as mediator between scientific knowledge and cognitive bias" (FCT 2022.08322.PTDC, 2023-24).

Keywords: Data Comics, Design Workshops, Health Misinformation

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Introduction

The rapid rise of social media (Ortiz-Sánchez, 2020) has greatly intensified scientific distrust and the spread of misinformation worldwide, largely due to the formation of echo chambers (Raballo et al., 2022). This issue is worsened by the ease with which subjective, biased, unreliable, unverified, or intentionally misleading information can be shared, alongside the appealing and addictive nature of simplified, overarching narratives.

These simplified narratives often clash with the complex information presented by health sciences, which requires expertise not common among the general public.

Significant efforts are made to translate intricate health knowledge into concepts and language that the general public can understand, forming the basis for targeted health policies. However, health researchers and authorities typically communicate using facts, infographics, statistics, and logic, while much of the population now prefers image deconstruction, humor, rumors, and personal anecdotes (Kostadinovska-Stojchevska & Shalevska, 2018).

DiResta (2023) highlights the necessity of adapting communication strategies to the evolving landscape, asserting: "Institutional communicators and public health entities fail to grasp that the methods of communication have evolved [...]; they must recognize the influence of storytelling." This insight is central to the current research, showing how a single report of a vaccine-related adverse reaction can skew public perception of statistical evidence showing such events are rare.

Moreover, psychologists and cognitive neuroscientists have shown that cognitive processes are not purely fact-based; Goel (2022) explains this as "The reasoning mind recruits the instinctive mind" (p. 155). This suggests that health authorities and policymakers must consider subjective elements in their public interactions. While emotions like gratitude towards healthcare workers and fear of mortality are used in public health campaigns, these typically adhere to traditional authoritative discourse.

Building on these observations, this ongoing research investigates various hypotheses for combating online disinformation and distrust in health policies. This includes leveraging social network aesthetics and semantics within authoritative communication. Communication Design can help by equipping students and professionals with the technical and semiotic skills needed for effective communication. Age is also a factor, as the rapid change in online semantics can render trends outdated almost overnight. Therefore, involving younger consultants in health-related content communication and behavioral pedagogy is vital.

Workshops and pedagogical practices with undergraduate design students have proven ideal for exploring online communication prototypes. In the framework of this project, various initiatives have been developed in this context at universities in the north and south of Portugal (see Alvelos et al., 2024). The initial strategy involved creating health-related memes to test the influence of humor, but these often-lost informational value in the irony. Subsequent exercises included infographics and printed media, but the gap between factual information and interpretation persisted.

Considering these challenges, the next set of sessions explored the potential of the data comics format to communicate complex scientific content through accessible visuals and

playful aesthetics. Data Comics, familiar to younger generations, were tested as tools to promote genuine knowledge-seeking behavior. They may also lower the anticipated formality of authoritative discourse, facilitating better cognitive and behavioral engagement.

The Data Comics Workshops

A workshop with three sessions was organized for Master's students in Illustration, Editing, and Print (MIEP) at the Faculty of Fine Arts, University of Porto. Held over three sessions between February and March 2024, the workshop aimed to foster a multifaceted understanding of the COVID-19 pandemic through data comics. They were conducted as an extracurricular activity, engaging six volunteer MIEP students.

From this initiative, six "data comics" were produced to test the feasibility of design and illustration in translating complex information into accessible forms for the general public. These comics served as a counterpoint to the proliferation of statistical graphics, which, while perceived as absolutely accurate, are often unreadable to significant portions of the audience.

Session Structure

Initial Session: The overarching project and previously developed outputs were introduced. For tangible outcomes, 3 case studies were selected of situations communicated and disseminated by the mainstream media that reflect inconsistencies and misinformation — "Oscillations of the Pandemic Peak", "On Tuesdays the Cases Increase", and "Bad Maths" (on this see Lima, Barreto & Alvelos, 2024). These case studies involved proper data analysis techniques and the identification of evolving patterns, information inconsistencies in mainstream media, differing interpretations of statistical data, and the balance between both Data Comics and Infographics. Focusing on key theories and methodologies in effective information conveyance and the importance of visual storytelling in public health communication, authors such as Lima (2011), Bertin (2011), Tufte (1983) and Wurman (2000) were presented at this stage that revealed the underlying visual elements that better tackle the challenges of representing information and data.

Furthermore, a set of bibliographic references were recommended, with regards to a more comprehensible connection on the potentials of storytelling in both information and data visualization (Gershon & Page, 2001; Kosara & Mackinlay, 2013; Segel & Heer, 2010) as natural consequence for combining rigor with a narrative form. Finally, Data Comics were presented as an implicit process that combines an engaging medium with quantitative data in a sequential manner. Bach et al (2017) describes the need for this format as we rely more on data to understand the world.

In the time that remained, possible conceptual and technical approaches to the project were also discussed.

Subsequent Sessions: The subsequent two sessions were devoted to practical developments of the Data Comics, including structuring the story to be told and the hierarchy of information, experimenting with different types of illustration and charts to be included. Participants developed prototypes, encompassing narrative structures, chart selection, and stylistic preferences. While the second session was more experimental, with moments of brainstorming, the final session centered on finalizing Data Comics prototypes, addressing minor corrections, discussing outcomes, and preparing poster-sized final layouts for printing.

Student Engagement and Process

Engaging students in this extracurricular project was challenging, as they were involved in their personal research projects the workshop took place during academic term time. However, the value of the workshop lay in equipping them with tools to develop illustrated narratives to communicate science, broadening their academic output possibilities. MIEP's curriculum plan does not provide for the infographics and date of comics in its structure, which allows it to gauge a more added value to add value to it. After the Workshop, the inclusion of infographics associated with the different territories of the illustration will be discussed.

Challenges: The biggest challenge was transforming statistical data into visual narratives. Students initially focused on combining storytelling with infographics. The process involved ideation, sketching, and refinement, using freehand drawing techniques, mostly on paper, then digitally refined using Procreate on the iPad and Adobe Photoshop.

Main Concepts: The goal was to merge data-driven insights with artistic expression.
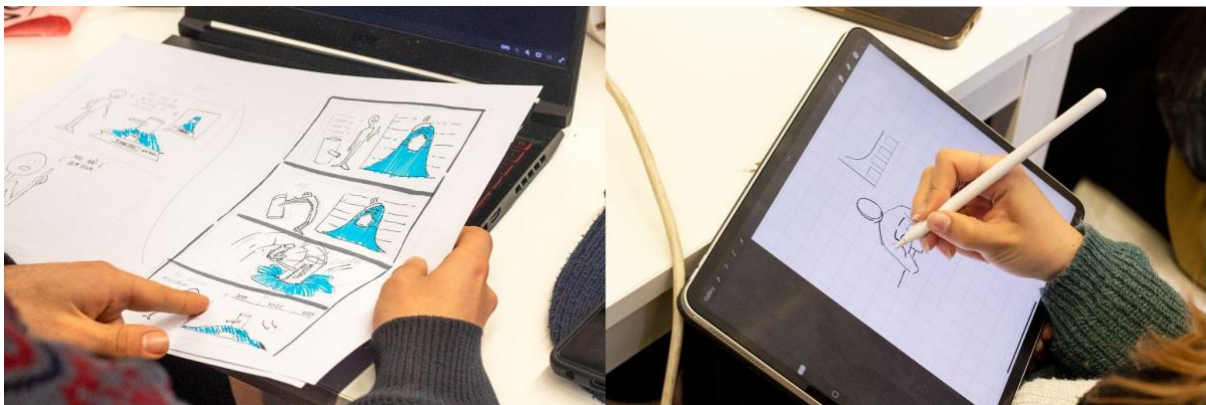

Figure 1: Images taken at the workshop - creative process, 2024 Source: Cláudia Lima

Case Study Selection

Three case studies of media misinformation in Portugal during the pandemic were selected from a larger pool to potentially highlight subsequent phenomena of disinformation. These case studies were chosen as sources for a workshop briefing, focusing on information inconsistencies in mainstream media, differing interpretations of statistical data by television anchors, and the imbalance between pedagogical and sensationalist rhetoric. These specific phenomena were used as templates for developing Data Comics prototypes.

Oscillations of the Pandemic Peak

This case study dates to the early days of the pandemic when there were numerous predictions about the peak of infections. It was widely publicized that without intervention, the number of cases would rise exponentially, leading to a peak after which the number of infections would decline. The concept of "flattening the curve" was introduced, emphasizing the need to spread out the number of infections over a longer period to prevent healthcare systems from becoming overwhelmed.

The media often failed to adequately explain that the goal was not just to delay the peak but to significantly reduce the number of infections through lockdowns and other measures. This misunderstanding was evident in the conflicting statements from health authorities. For example, on March 27, 2020, Graça Freitas, the Director-General of Health, mentioned that the peak would be delayed until May and would manifest as a "plateau of a few weeks" (TVI Notícias, 2020a). This message was confirmed by the Health Minister, Marta Temido (TVI Notícias, 2020b).

Despite these forecasts, on April 2, 2020, the President of Portugal announced that the peak had been delayed (Carmo, 2020), while Freitas reiterated the uncertainty about the peak's timing a day later (Malta, 2020). These statements, often accompanied by animated graphs showing the expected curve, reinforced the assumption that the number of cases would remain the same regardless of containment measures.

However, pulmonologist Filipe Froes clarified in an interview with RTP (2020) that the goal was to "crush the curve," not just flatten it, stressing the importance of strict adherence to social distancing to reduce the number of infections. Ultimately, the peak of the pandemic occurred at the end of March, as reported on April 8, 2020 (Maia & Ferreira, 2020).

On Tuesdays the Cases Rise!

This case study examines a pattern observed in the reporting of COVID-19 cases, where a noticeable increase in cases was reported at the beginning of the week, particularly on Tuesdays. This pattern was due to the flow of testing and clinical analysis, which slowed down over the weekends and led to a backlog of cases being reported on Mondays and Tuesdays.

Television news programs often highlighted this sharp increase in cases without explaining that it was a result of the reporting cycle rather than a real surge in infections. Accurate analysis would require comparing the number of cases with the same day of the previous week or the total number of cases in consecutive weeks. However, this context was frequently missing from media reports, leading to public confusion. Daily reports from the DGS included charts that provided a more reliable analysis of trends, but these were often ignored by the media, which preferred to create their own, less informative charts (see figure 2).

Figure 2: Graph presented on TVI's Jornal das 8 broadcast on February 3, 2021 at 8.16pm.
The reporter remarked on the increase in cases (based on the previous day),
stating that 'we still do not have a defined trend' (TVI and Carvalho 2021)

Bad Maths!

The third case, "Bad Maths!", focused on the misinterpretation and misreporting of statistical data by the media. Often, statistical errors and misrepresentations in the data presented by television anchors led to misunderstandings about the actual state of the pandemic. This case study highlighted the need for better statistical literacy among media personnel and clearer communication from health authorities to avoid spreading misinformation.

Summary

These three case studies were used to develop Data Comics prototypes, aiming to translate complex information into accessible and engaging formats for the general public. The selected case studies not only provided real-world examples of misinformation but also served as a basis for exploring how visual storytelling and design can improve the communication of scientific information during a health crisis.
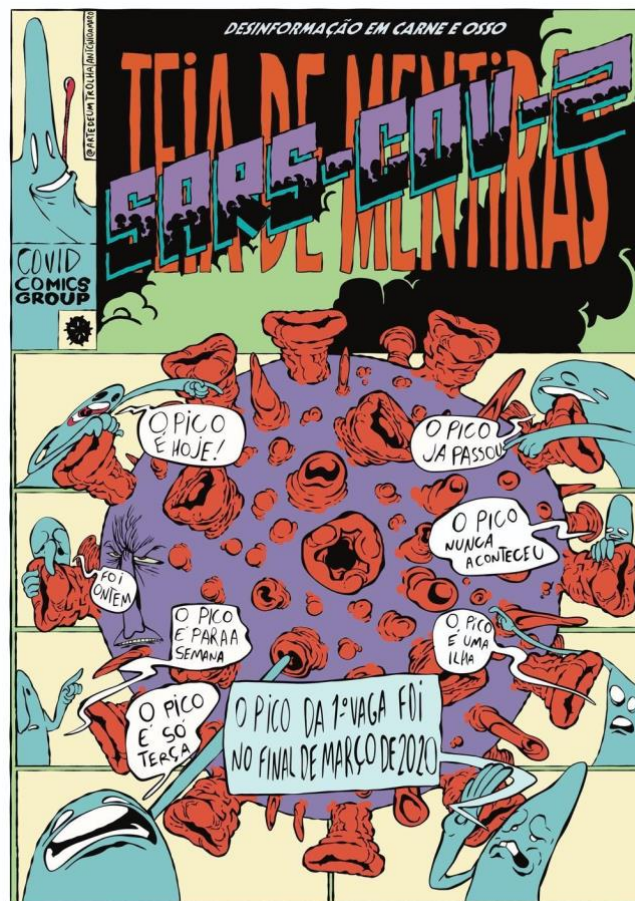
Examples of Student Work

Figure 3: Teia de Mentiras (Web of Lies), António Amaro, 2024

António Amaro
The subject "On Tuesdays the cases rise!" was addressed by António with the creation of a poster inspired by comic book imagery, using typography to simulate a comic book cover and calligraphic text in speech bubbles. He resorted to vibrant colors in a strategy of simulating vintage comic books.
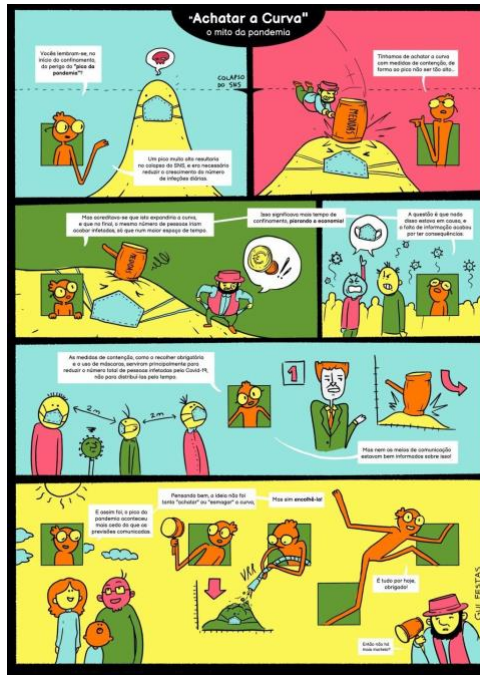
Figure 4: Achatar a Curva (Flatten the Curve), Guilherme Festas, 2024

Guilherme Festas

For the subject "Oscillations of the pandemic peak", Guilherme designed assertive panels with strong, contrasting colors, using symbolic iconography like Zé Povinho, an homage to the caricature created in 1875 by Portuguese artist Rafael Bordalo Pinheiro, to create empathy and engage viewers.
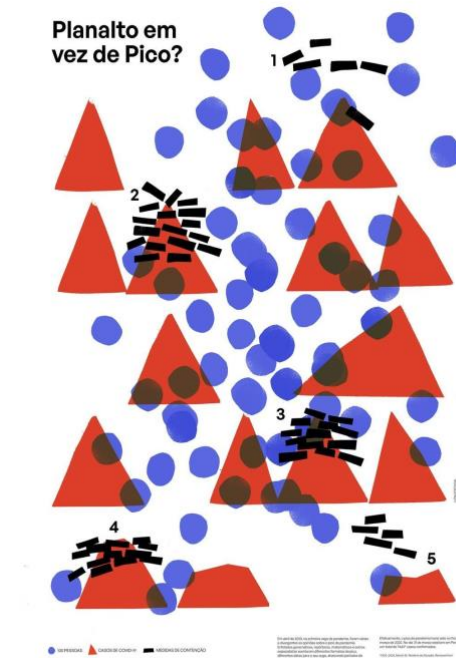

Figure 5: Planalto em vez de Pico? (Plateaux instead of Peak?), Luísa Portugal, 2024

Luísa Portugal

Opting for the subject ""Oscillations of the Pandemic Peak", Luísa used a more abstract and modernist composition, anchoring the image in a caption to decode graphic forms.
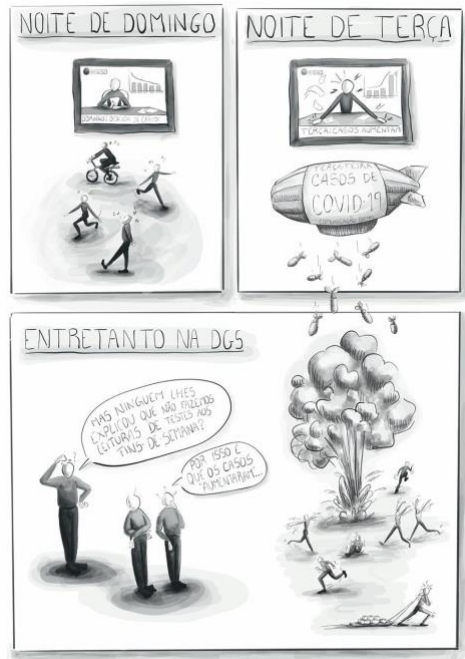
Figure 6: "On Tuesdays the cases rise!", Luísa Silva, 2024

Luísa Silva
For "On Tuesdays the cases rise!", Luísa used a simple narrative in three panels, effectively conveying information with minimal ambiguity.

Figure 7: Às terças os casos aumentam (On Tuesdays the cases rise!), Marta Carrelhas, 2024

Marta Carrelhas
Also for "On Tuesdays the Cases Increase", Marta created a conventional sequential narrative without panel frames, emphasizing manual drawing and fluid line work.

Figure 8: À terça os casos aumentam (On Tuesdays the cases rise!), Sara Duarte, 2024

Sara Duarte

Again for "On Tuesdays the cases rise!" subject, Sara designed a poster with expressive composition and character prominence, blending elements for clear linear reading.

Validation and Feedback

Once the workshop was over, a discussion was held based on the following questions:
- What were the main challenges faced while developing the Data Comic?
- What data sources were used for COVID-19 communication information?
- What was the process like for transforming quantitative data into a visual narrative?
- Does the contribution clearly communicate information about COVID-19 communication?
- What visual elements are most effective in conveying the message of your poster?
- Are Data Comics an effective tool for science communication?

In summary of student responses:
- The responses were unanimous in considering as the main challenge the creation of a clear visual narrative that accurately translated COVID-19 data while being engaging and appealing.
- The participants used mainly the official website of the Direção Geral de Saúde (Directorate-General for Health) for research.
- The process involved selecting data to be included in the narrative and defining visual elements that could symbolize the data and the reality at the time.
- Data Comics were considered effective tools for science communication, as they create empathy and help the population relate better to the information presented.
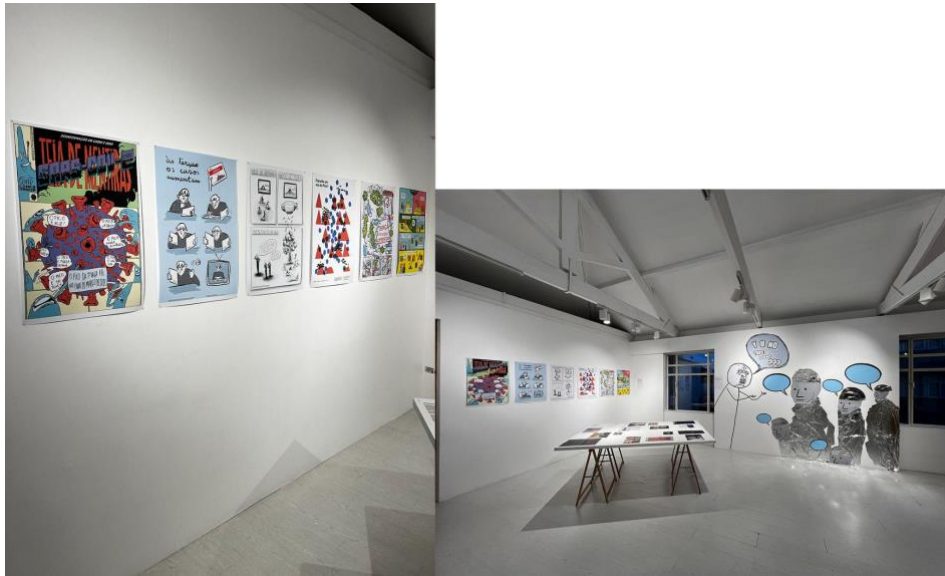
Outputs and Public Exhibition

Figure 9: View from the exhibition "o_U: an exhibition of
meme symptoms and side effects", 2024

A public exhibition titled "o_U: an exhibition of meme symptoms and side effects" was held at Maus Hábitos gallery, in Porto, Portugal, between the 7th and 31st of March 2024. This exhibition tested the viability of online-offline support in the subjective approach to public health policies, particularly in the face of growing misinformation phenomena. It explored possibilities of merging formal rhetoric with expressive content circulation and included the aforementioned student work along with various other pieces of diverse provenance along the overarching project.

Following the exhibition, a second instance of validation involving external analysis and feedback was conducted on May 25, 2024. This instance, a focus group, consisted of four individuals with no prior exposure to the project: two young participants aged 11 and 13, a communication sciences undergraduate student, and a preparatory schoolteacher. The outputs were presented, and the participants were prompted with various questions, such as how they read each Data Comic, whether they considered the message to be effective, the credibility of such media and their preferences in communicating health-related information. The session lasted two hours and was led by five project researchers.

The six outcomes of the workshop were presented in printed form. Of the three issues addressed, the one with three prototypes was the most discussed: the widely disseminated, equivocal news piece that argued COVID-19 surged on Tuesdays (Figures 6, 7 8). Of the three outputs, the most formally neutral, detailed, and informative was chosen as the most effective (Figure 6): to an extent, this preference contradicts the expectation that a subjective component could initiate a process of trust; however, aesthetic components were acknowledged as potentially decisive in involving demographics whose tastes might coincide.

Overall Data comics were acknowledged as a format with clear advantages and adding a storytelling component, seemed attractive by all present.

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Some considerations emerged throughout the session that pointed towards future exploratory developments, such as:

- The need to customize content and aesthetics according to age groups and distinct demographics, contextual customization might be key as well.
- Humor and irony should be employed with caution, as they could easily be the root cause of equivocate, even opposite, interpretations - and consequently, further instances of misinformation.
- The contextual vocation of each print-out was addressed: two were acknowledged as potentially more effective in a health center waiting room (see Figures 4 and 6), whereas one was deemed as potentially more effective as an outdoor ad (see Figure 5); one prototype, whose aesthetic clearly mimics a comic book cover (see Figure 3), was regarded as a potential starting point for the actual production of a comic book - or at the very least a conversation starter in a classroom environment, employing aesthetics compatible with young students' own interests.
- The potential for articulation with online and cultural trends at a given moment was equally noted; given contemporary culture's current accelerated pace, there would be a need for a constant renovation of semantic and semiotic repertoires in content production, through consultation with specialized segments of the population.

Figure 10: Poster of the exhibition, "o_U: an exhibition of meme symptoms and side effects", 2024

Figure 11: Image taken at the focus group, 2024. Source: Cláudia Lima

Conclusion

The results of the workshops were satisfactory, prompting the integration of Data Comics development into the curriculum for the Master's program in Illustration, Editing, and Print. This addition is seen as a valuable enhancement, providing students with the ability to visualize information, which is a critical tool for strategic research opportunities.

Data comics have revealed significant promise as a design format towards improving the communication of scientific information and supporting behavioral pedagogy. Positive feedback emerged from the creative workshops with design and illustration students, as well as from the initial validation by the focus group that included young social media users and education professionals. Despite these encouraging early outcomes, further prototypes must be developed and subjected to additional validation. The present conclusions are preliminary, as they are based on six prototypes, each addressing only a portion of the wide range of possibilities that data comics may come to offer.

Future validation should involve larger and more diverse groups of participants in order to ensure comprehensive feedback. This includes considering different age ranges and literacy levels. Additionally, the settings for presenting these prototypes should be diversified in order to assess their effectiveness in different real-world contexts. For instance, presenting data comics in health centers and train station platforms, as suggested by a participant in one of the validation sessions, could provide valuable insights into their applicability and impact.

Expanding the scope of validation will help refine the design and application of data comics, ensuring they effectively bridge the gap between complex scientific information and public understanding. This approach not only enhances the educational experience for design students: it contributes to the broader and increasingly urgent goal of improving public health communication and combating misinformation.

Funding

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