HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

AND THE GENERAL PUBLIC ENGAGEMENT IN SCIENCE

INSIGHTS REPORT BY
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BACKGROUND

HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

Science helps us understand and perceive the world we live in. It improves our quality of life and well-being as well as keeps moving our society towards progress. Science is in the core of almost everything we use and do and it is one of the main building blocks of an enlightened and prosper society.

But for many years **one of the main problems in the scientific fields** is how data, research and ideas are relayed to the general public (Belluz, Plumer, and Resnick,2016). Many people nowadays are misled and believe in information that is short of any kind of scientific credibility. **This lack of proper science communication** results in the accumulation of many misconceptions and ignorance in our society.

Filling the gap between the scientific community and the general one is crucial because it shapes an intelligent nation, helps our personal development and ability to ask questions. Besides that, it strengthens our critical thinking and ability to solve problems. Public engagement in science **can also be a tipping point** in important decision making at all levels, from governmental to personal (Feliú-Mójer, 2015).

AIMS AND OBJECTIVES

HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

Science communication is a pretty broad topic. Therefore, the existing gap has many causes and small issues within it. In this context, **this report will aim** to research and highlight as many aspects linked with the stated problem as possible to open doors for graphic design to improve science communication and the general public engagement in science.

The main goal of this report is to provide a deeper understanding about the essence of science communication and its effectiveness of relaying information to the non-expert part of the society and with that to help **find and select one single problem** that will be tackled in the next part of the Research Project module.

Following this thought, **this document is set out to answer** the following main questions:

- **What is science communication?**
- **What's the public's attitude toward science?**
- **What's the general knowledge of science?**
- **What's the overall engagement with science?**

Along the way, **this report will also collect and measure information** about other additional topics which will bring more accuracy and depth to the insights of the problem.

Those topics include:

- **What hopes, needs or concerns do people have regarding science?**
- **People's trust in science and media**
- **Knowledge about funding, research and specific topics**
- **How do people get involved in science?**
- **The role of media as a science communicator**
- **How young people consume news?**
- **Science as a cultural activity**

METHOD

HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

As mentioned before, this is a complex subject with a lot of interrelated aspects. Therefore, **a mixture of different methods** needed to be applied to obtain a detailed perception of the bigger picture of the problem. The different objectives required different approaches.
The primary research has been carefully picked to complement and fill the gaps in the information originally investigated.

The methodologies used were:

Online research and literature analysis

The first method on the agenda was used to provide answers to the main questions stated earlier in this file and to some of the additional topics as well. The main literature source for this part of the research was the **2014 PAS Report** on Public Attitudes Towards Science, which offered the latest data regarding this subject. It highlighted diverse viewpoints that revealed the ground problems within science communication. That's why its breakdown was crucial for fulfilling the goals of this report.

The second biggest spring of information used in this method was the **2019 Flamingo X Reuters** Institute Report on How Young People Consume News. The need for analysing this study came from a revelation in the PAS report which suggested that digital media could play a distinctive role in the way our society interacts with science. For that reason, understanding the people's mindset and habits about news consumption gave a clearer idea of how to approach this potential challenge further on.

Comparison research (ethnography & interviews)

This method was chosen to deliver extra insights on the topic of science as a cultural activity and a problem within it that was detected in the PAS report, which will be discussed later in the document. Here compared were two institutions, both dedicated to science communication, but with totally different approaches to it. **The goal** with this method was to evaluate the overall experience in the two places. This was determined by measuring how each approach affected the audience as well as if one was better than the other in effectively communicating science. For this purpose, an ethnographical study was done to investigate the behaviour of the audience within this environment and to provide comprehension of how their attention could be intrigued. Then short interviews were conducted to provide insights on a more personal level.

A short quantitative survey

The subject of science as a cultural activity raised one more issue that needed a little bit more clarification. **That's why** a survey consisted of just one question was done to identify a trend in the public's awareness about science festivals.

DISCUSSION

HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

1. What is the essence of science communication?

At its core, the purpose of science communication is exactly what it sounds like. This discipline is dedicated to **building bridges** between the scientific community and the laypeople of our society by delivering and **translating information** in an accessible and easy to comprehend form.

But its mission doesn't stop there. This practice also **plays a main role** in supporting studies and research.

According to Emily Dawson (2013) as the research in science, technology and other related subjects continued to grow, many misconceptions and controversies started to appear. Debates about scientific methods increased and that's when the need for good communication was felt the most. **She points out** that disasters such as the agitations about genetically modified food, worries about the MMR vaccine and animal cruelty **made the professionals ask** for more involvement from public's side and seek their opinion on science.

This shift from informing to discussing meant that political decisions started to be pursuant with the general perception of what's too scary, unethical or dangerous to be investigated and funded.

As Dawson reveals, today science communication has evolved to great extends and people working as communicators can do a wide variety of activities. But although this disciple offers a lot of career options and communication tools "science is a thing you do at school when you're young and is something you see on TV or read about in the newspapers or online when you're older" (Dawson, 2013)

Judging by her words, today science is still seen as an academic obligation or as a random piece of information which people don't really understand. **Therefore**, the established communication doesn't do as an effective job as the scientific society needs. **This issue** not only restricts people's ability to make adequate personal decisions but also stops them from having a voice when it comes to debates about the role of science in their lives. **To further measure** the boarders of this complication and determine the causes for it, this report takes a deeper look at the public's engagement in science. The most recent report regarding this topic is the **2014 PAS report on Public Attitudes to Science.**

2. What's the public's attitude towards science?

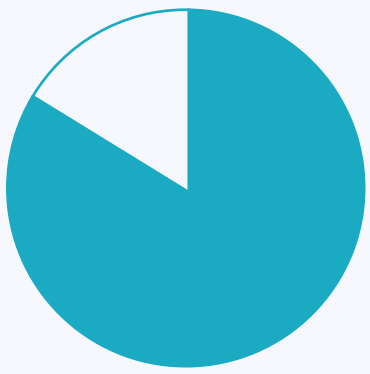
- Overall opinion and awareness about science
- People's hopes and concerns about science
- The public's trust in science and media

The good news from the PAS report is that most of the UK public were **highly positive** in their response to the statement that science is beneficial to society and that it contributes to the growth of the future prosperity of the country. Adding to this, around **seven-in-ten** think that it's important to know about science in their daily routines and **81 % agree** that science will make their lives easier. There's also **a significant appetite** for hearing more about scientific and technological developments, but only before they happen and not after.

As this statistic may seem promising, unfortunately, **it doesn't correspond** with the level of the public's awareness of science, which will be discussed in the next section. **Moreover**, almost half (45%) of the participants in the study have said that they don't think **the benefits of science outweigh the dangers** it could bring. People over the age of 65 are more likely to be concerned about the pace with which science is developing and about the fact that it is **too fast to follow** and therefore difficult to be controlled by the government.

This is the place to also mention that young adults stay neutral in their attitude towards science, which is worrying considering that this age group is the one that plays the main role in determining the overall mindset of the public.

One more area that is problematic is the lack of trust in science journalism. **According to 71%** of the UK public, media sensationalises science, and this has been a trend since 2000. One suggested solution to this was that more discussion articles were written or at least making more layperson-friendly ones.



81%

agree that science will make their lives easier

3. What's the public's knowledge about science?

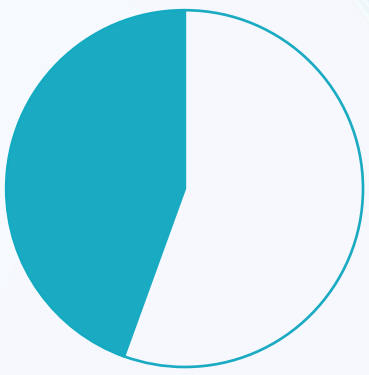
- General awareness
- Awareness on science research funding
- Knowledge on specific topics

As mentioned earlier in this report, the positive response of the public regarding the importance of science isn't equal to the level of knowledge about it. **To start with,** more than half of the subjects (55%) in the PAS report have said that they don't feel informed when it comes to research and developments. **According to most of them**, this issue is caused by the little amount of effort that scientists put into informing society about their work. **The lack of awareness** about this matter arouses many misconceptions about how scientists work. **From there** comes the negative perception of one-third of the audience that experts adjust their findings to achieve the answers they want. Another third stays neutral about this topic. **This indicates** a lack of interest and engagement which affects the general quality of the science communication and people's attitude.

Another area that needs shedding some light on is how scientific work is funded. **Although** overwhelmingly big amount of the responders (79%) are in favour of government funding of science, almost the same number said that the government is the main institution that funds research which is not the case. In fact, each one of us indirectly supports research and development in that area by paying taxes or buying products and services (Understanding Science). **Here comes the thought that** if people don't know the future of science is in their hands, they're never going to change their point of view nor level of engagement.

How could design make the public recognize their role in science and increase their involvement in it?

How could design inform and show people how scientists work?



55%

don't feel informed about research and developments

One more interesting topic to look at in this study is to what extent people are aware of the different fields of science. **A peculiar result** that came out from the PAS Report was that although most of the participants **didn't feel well informed** in general about science the same thing couldn't be said when it came to specific areas. **Topics like** synthetic biology, nanotechnology, stem cell research, GM crops and nuclear power are amongst the leading fields were people **don't feel confident** enough in their competence. In contrast to that climate change, vaccines, renewable energy, economy and animal research were measured to be the sections with a **positive net score** in people's awareness. Another thing to mention here is that the PASS report only covered only four out of **the Eight Great Technologies**, a UK government's programme that will '' propel the UK to future growth and help it stay ahead in the global race''(Science and technology facilities council,2016).

The real question that comes here though is if feeling informed equals being informed about the realities of science.

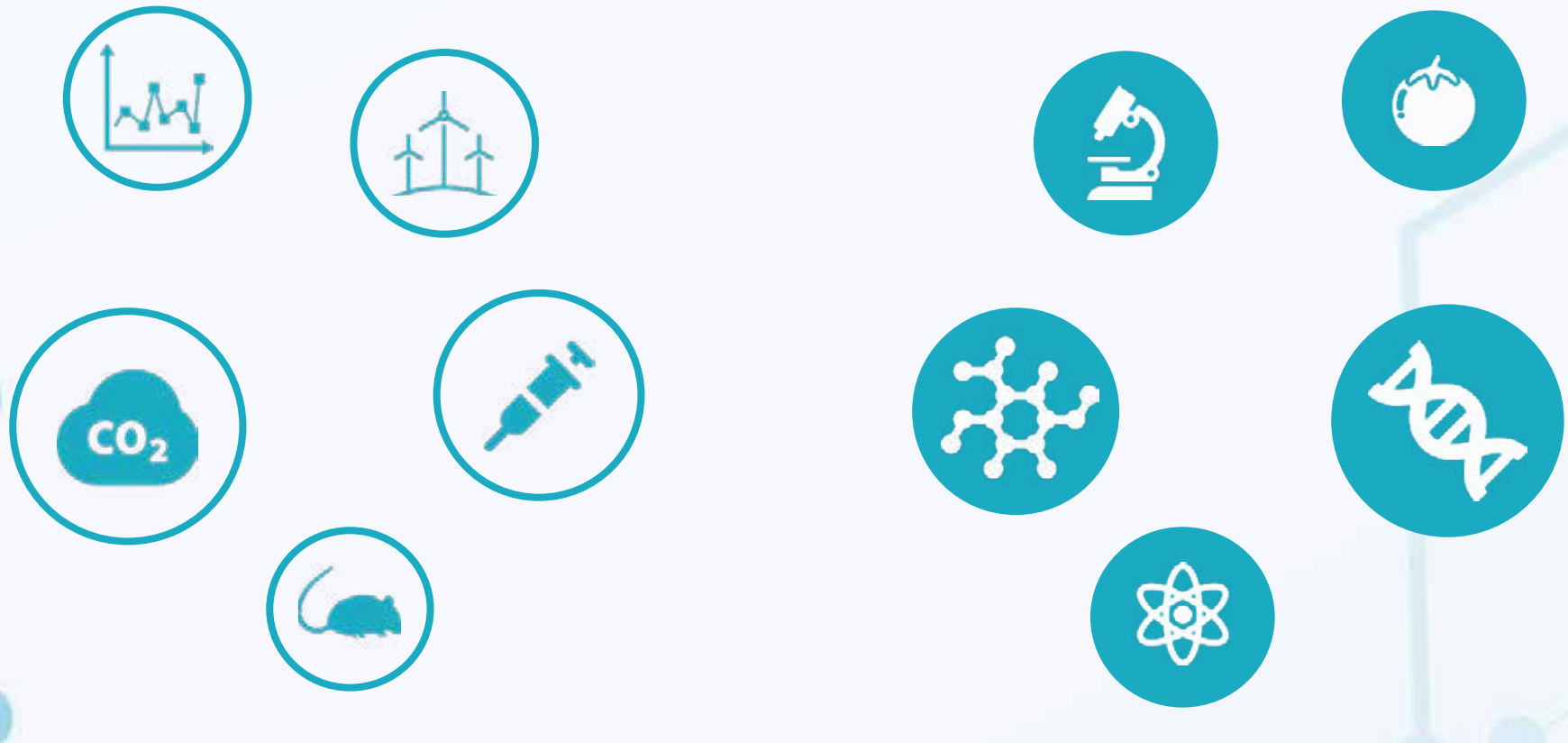
In most cases, the people who claimed that they felt well informed **haven't been exposed** to accurate scientific research and data. One example that's been given in the study is that most of the participants who felt aware of the issue with animals in research don't know that all the drugs in the UK must go through animal testing before being released for human consumption. This is not the only field that has been misunderstood.

How could design bring clarity on topics with lots of misconceptions?

How could design educate people on the Eight Great Technologies?

Positive net score

Negative net score



An important thing to note here is that as the PAS report points out, the level of awareness highly depends on where people get the information from. **For this reason,** in the next section, a deeper look will be taken at how people engage with science and what sources of information they use.

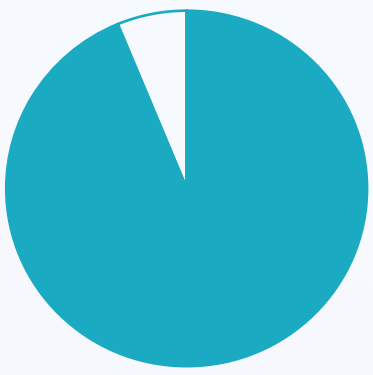
4. How do people engage and interact with science?

- News consumption
- Cultural events

It's a fact that social media and internet usage has increased significantly in the last decade and research has found that when it comes to scientific news the vast majority of the UK public still uses **traditional media** like newspapers and TV as their main source of information (PAS Report 2019). Although the overall response was in favour of the offline media, there was an exception when it came to young adults aged 16-24 who were more likely to obtain news from **online media**. Findings from the report also suggest that social media can be a successful method of communicating science. Content that is presented with **humour and visual appeal** component is usually well received and is more likely to get noticed and shared. **The obstacle** that science communication encounters here is that the prevalent conversations lead on social platforms often lack credibility of science content, therefore lead to misconceptions and arguments. Knowing all of that, adding the statistic that **according to 91%** of the UK audience ''young people's interest in science is essential for our future prosperity''and the fact that most of them aren't engaging or seeking enough information in that area, the next part of this document **is going to concentrate** more on the way young people are receiving and perceiving news.

young people use online media

adults still use traditional media



91%

agree that young people determine future prosperity

With the fast pace with which online communication is developing the next this that is going to be measured in this text is how trends in that aspect have changed since 2014 and what obstacles might be in the way of effective online science communication. **This will be accomplished** by taking a deeper look at the most current study dedicated to understanding how young people consume news published **by Flamingo x Reuters in 2019.**

A thing worth mentioning here is that although the information and the strategic options provided in the study are mainly aimed at content producers (news brands), there are also areas and problems where design can contribute to the better engagement and news consumption.

On the report of Flamingo x Reuters today young people are mainly led by their desire for entertainment. The new generations see news not only as of the things that they need to know, in contrast to the conventional news suppliers but also as things that are **fun and interesting** to know. This age group have much higher expectations than previous generations when it comes to the online experience. **Especially important** factors for them are flawlessness and personalisation.
To measure how people engage with the news, first, the main types of news moments should be categorized and understood.

The Flamingo document has identified four:

"Dedicated" are characterised with strong narrative and quality analysis. They are occupying and require more attention, therefore are less common and less used.

"Updated" are the time-savers. They are summaries and people tend to connect with them in the mornings, when preparing for their day.

"Time-Fillers" occur constantly throughout the whole day and provide entertainment and satisfy the curiosity of the audience.

"Intercepted" could happen anywhere at anytime under the form of notifications or messages. The person exposed to this type of news is a passive recipient, but intercepted news is a key for more exposure.

The report has provided even more detailed insight on what news sources could be found on the phones of the younger audience.

Dedicated

Updated

Time-Fillers

Intercepted

They want easy, quick and convenient access to data and by browsing through the social media in their free time they immediately get exposed to news as well. Digital media is their main source of what's going on in the world. Although this is a ''time-filler'' source of information, it still has a huge potential to grab people's attention and engage them in a specific topic.

There are different groups of news consumers identified in this report and although there's no **''one-size-fits-all''** solution to satisfy all of them, there are some strategic options that could be applied to increase the engagement In news of the under-35s. **The Flamingo document recognized** five summary challenges for news providers and the problems from them that feel relevant to design communication have been selected to potentially aid forming a brief.

These problems are:

- **How can design help present complex information in bite-size ways?**
- **How can illustrations and animations be used to enhance the user experience?**
- **How can we (designers) use technology to provide personalised content to the audience?**
- **How can we use design to break down the same story and adapt it to the different platforms?**

The 2014 PAS report also suggests that a good amount of the public also undertakes science activities within a broader scope of cultural events. **It's been estimated** that places like zoos or natural reserves were more popular than museums or discovery centres. **This indicates** that people who visited the first two destinations were looking more for entertainment rather than knowledge and got in touch with science unintentionally. **The lack of excitement** and interest in institutions with concentrated science information is alarming and is a problem that could further be investigated in the next part of this project. But to eventually start looking for solutions to how might design help increase the interest in such centres, a better look at how people engage with them should be taken.

As mentioned in a previous section of this report, to gather deeper insights about how the public engages with science institutions, first-hand comparison research between the **Cardiff Museum** and **Techniquest Science Discovery Centre** has been conducted.

- **Ethnographic observation**
- **Interviews**

The first factor to note when comparing both places was their audience. **At the discovery centre** the visitors were mainly parents with their children, whereas, at the museum besides those, there was also a variety of groups and ages. **The main thing** that made an impression when visiting the locations was the level of engagement with the displayed information. **At the museum**, people seemed to be paying more attention to the data **in contrast to** the people at Techniquest. The parents there were busy running after their children, who were playing with the installations and didn't have much time nor interest to check the information. On rare occasions, the parent would take the time to understand the point of the equipment and then try and explain it to their kid.
To put it in a nutshell, although the exhibition at the discovery centre was much more interactive and used modern approach and technology, the museum provided a sense of peace which made people immerse more. **On the other hand**, people at the discovery centre were going through almost all the installations, whereas at the museum they would often skip displays.

To get a more accurate viewpoint about people's experience further research was undertaken. **Interviews** with the visitors, adults and children, were conducted as well as one with a science communicator at the science centre.

First, people at both places were asked to express their opinion on what was the most and least memorable part of their experience. These questions aimed to provide understanding on how people's curiosity could be provoked and respectively repelled. People interpreted the questions differently in both places.

At the museum, they judged by topic and at the centre by installations.

At the first place the most memorable parts, for adults and kids, were either dinosaurs or space and the least favourite, plants and fish. **Another way** to look at this information is that people found the unusual and unknown things exciting, whereas the ones they could see in their everyday life seemed dull.

Steven,16
Martin,17

"We liked the dinosaurs,but the fish was quite boring"

"The themes' flow is a bit random and confusing. Better layout would be nice."

People, mainly kids, at the discovery centre were **fascinated by "the big screen",** which also projected AR dinosaurs, and the science show. The children were especially impressed by the show and the explosions in it, where the staff demonstrated how the different gasses worked by using bubbles.
It was interesting to observe how the show made the children look through a new perspective by taking something so familiar and fun to them and using it as a science communication tool.

Josh, 11

Next thing that was discussed was the way the information was presented at both places. **At the museum**, some people thought that the information is a bit overwhelming and chaotic. They found it confusing to navigate through the data and said that they'd like it to be more organised as well as to include better visuals or signage to aid navigation.

Peter, 29
Sally, 34

"What I loved most about the show was the BANG!"

On the other spectrum, the visitors were challenged to say which part they didn't like, but on several occasions was mentioned that exhibits that haven't been changed for years got boring.

"We read some of the things, but we're very visual. The information is also quite unorganised at times"

Anthony, 31

"My son was fascinated by the bubble show"

"The things that are have been here for years are not as interesting anymore"

How technology could be utilized to keep museums up to date with the latest scientific developments?

How could design better organize and present data at museums?

At the other place, people who stopped to look at the labels appreciated that the information was kept minimal but still provided just the right amount for them to understand the science behind the installation. The ones that didn't have time to read said that they really enjoyed the way the show presented information and that they'd enjoy if the same thing was done for the exhibits as well. **In their opinion**, it would be beneficial if a member of the staff was there to answer additional questions they had.

Nicola, 41

“The guy doing the bubbles with the dry ice was interesting to observe. I wish the same thing was done for the other things as well”

How could technology and design provide a way for people to access additional information at museums?

To get one more different point of view, a science communicator from the Techniquest’s show was interviewed. **This research gave insights** on the behind the scenes of the science shows at the centre as well as more on the challenges of communicating science, particularly to kids.

Jordan, 21

To the first questions **“What’s the process behind designing the shows?”** and **“How do you pick the content?”**, Jordan (2020) said that he wasn’t familiar with the content design of the show. **However,** he and his colleagues have a big role in refining it, which happens during their training.
When it comes to the content itself, Jordan pointed out that their weekday show content is “loosely based on the curriculum of the local primary schools as they tend to book visits on school days to come and learn more on a certain subject”(Jordan,2020). Their weekend shows, however, may vary but they usually cover themes from the three main sciences. **Jordan also noted** that they don’t have a specific script for any of the shows, only key points to follow.

Talking about script, the next question was **“How do you make sure that the information Is clear and easy to follow, especially by the younger audience?”.**

Here Jordan explained that they didn’t have a plan towards adapting the language to suit the younger audience. He stated that as long as they understand the science behind the demonstrations it comes naturally for them to explain it to the children. But this is not always the perfect approach since he also said that there are always ” people coming down and telling us that they didn’t quite understand it or that their kid was confused”. So, they mainly rely on trial and error to get the language right.

This also answered the next question **“Do you get any questions after the shows?”.**

Here **Jordan also added** that whenever that happens the presenters try and do the demonstration again, but this eventually caused the waste of more materials.

Lastly, the topic of how often they update their shows according to the latest discoveries was discussed.
To this question, Jordan answered that the newest discoveries are quite complex to be explained at their main shows that were **children-focused**, but they do talk about those topics in their after-hours and Planetarium shows for adults.

Other participants in the interviews:

Mark, 39
Zac, 12

Jamie, 9

Merry, 40

Logan, 7

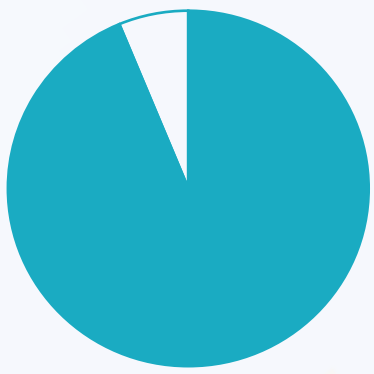
Molly,21
Andrew, 23

How could we use graphic design to help science presenters better communicate with the younger audiences?

Finally, there's one more peculiar topic this report is going to quickly touch on. Another vehicle for science communication is science festivals. **Unfortunately**, only 3% of the participants in the PAS study have said that they've attended such event, which is a pity because such activities have the potential to be a key tool in changing the general perception and interest in science. **The question** that came from this low engagement in science festivals was if people are even aware that they exist. So, a short survey was conducted to identify the trend of awareness on this topic.

When 40 young adults were asked if they've heard about science festivals, **only 21%** of them responded positively.

Moreover, at that time in Cardiff, a science festival was taking place and those **79%** didn't even know about it. That makes one more problem that could be tackled.



79%
young adults don't know about science festivals

SUMMARY

HOW COULD DESIGN HELP IMPROVE SCIENCE COMMUNICATION

The problem that was investigated is **far-reaching** and probably a lot of issues remained untouched. **However**, with the given time, this report managed to reveal many directions which graphic design could take to help improve science communication and increase the general public awareness of science. Amongst them, **several problems stood out** as the most alarming that need dealing with. But to pick one single problem out of them, for the second part of this Research Module, a couple of factors will be taken into account. **First of all**, the target audience. **As the report revealed**, the main element for forming the overall public mindset is the young audience, which isn't engaged enough in science. So, the solution to the picked problem should target this part of society. **Next,** the subject. It's hard to tell which is the most problematic area of this issue because all of them are platforms that could greatly contribute to the better communication between scientists and the public. But, after all, we live in a **fast-moving world** and if people want to be able to make adequate decisions, they should be up to date with the technologies that are dominant in the UK and that keep pushing it forward. The **Eight Great Technologies** is a subject that provides a fantastic opportunity not only to educate people on modern science but also to make them aware of their role in the future of those scientific areas and respectively the prosperity of the country.

To sum up, to form the final version of the original question of this report, two of the themes from it will be combined.

Those are:

- **How could design educate people on the Eight Great Technologies?**
- **How could design make the public recognize their role in science and increase their involvement in it?**

Together they outline the following brief:

How could design make the general public recognize their role in modern science by educating them on the Eight Great Technologies of the country?

Eventually, this version of the question may slightly change, but its essence will remain the same. **The next part** of the Research Module could also further utilize themes from this report, **to strengthen** the solution of the brief or to generate ideas for it.

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