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NEGLECTED SPACES IN SCIENCE COMMUNICATION

Knowledge°Room exploring social justice by going beyond 'traditional' spaces and activities of science centres

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Abstract

This article describes an example of science engagement striving for social justice by invigorating neglected spaces. The pop-up science centre "Knowledge°Room" in Vienna encourages learning, participation and engagement and provides accessibility to different groups regardless of their background. Based on a case-study of a bottom-up event at the Knowledge°Room, we show how science communication can create a trust-based connection with disadvantaged groups in society and inspire their curiosity in science. We argue that science communication can be used as a tool for advancing social justice in the wider sense and facilitate encounters between diverse groups within society.

Keywords

Public engagement with science and technology; Public understanding of science and technology; Social inclusion

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Context

Science[1] is strongly connected to our everyday life. The rise and advancement of technology has influenced our experiences and human to human interactions. In light of current worldwide challenges such as the COVID-19 pandemic and climate crisis, it is more obvious than ever that everyone is affected by science-related issues. However, traditional science communication is mostly targeted at those who have an affinity with science and privileged groups.

As part of our work at the Austrian Science CenterNetwork, a non-profit association for science engagement, we have set up the pop-up science centre Knowledge°Room[2] (further abbreviated as K°R). Here, we are deliberately using

[1] Here "science" is used as an umbrella term for science, technology, engineering, and mathematics related subjects.

[2] In German "Wissens°Raum".

neglected spaces (in this case empty shops in disadvantaged urban areas) for science communication, which then takes place in the neighbourhoods of our primary target group, namely underprivileged communities.

In 2013, we started the first K°R as a pilot project in Vienna, Austria. The basic idea was to temporarily offer science centre activities in neglected community spaces, so that anyone passing by could just walk in and engage. This use of disused retail spaces created a familiar setting, as everyone is familiar with entering a shop, browsing its content and leaving whenever they are ready. Thus, visitors did not have to learn new rules or adapt to an unusual culture [Streicher, Unterleitner and Schulze, 2014; Dowell, 2017].

Since the start of the project we have launched eight temporary K°R in seven districts of Vienna (open for 2–4 months each) as well as one longer-term location ($>$ 10 months) with a total of over 15,000 visits. Our experience has illustrated how the K°R format works in a wide variety of contexts, as well as with people of different backgrounds [Schulze and Streicher, 2017]. This was also confirmed by cooperation partners offering similar settings such as the K°R in Graz[3] and Paris.[4] Our "pop-up science centres" have been well accepted by a socially mixed audience, thus contributing to social inclusion in urban districts.

Knowledge°Room characteristics

The idea of the K°R is based on the experience that curiosity and playful settings enhance learning experiences and inspire interest in scientific and technical topics [Bulunuz and Jarrett, 2015; Zosh et al., 2017]. This is a principle typically used in science centres worldwide, however, science centre visitors are predominantly educationally advantaged [Dawson, 2014b]. The fact that there is no dedicated science centre in Vienna is included as an opportunity in the fundamental idea of the K°R. Instead of a single, prestigious venue, we create experimental, free learning locations in educationally disadvantaged districts, striving for fair access for everyone. Thereby, we reach families who have never been to a museum and cannot afford any extracurricular activities.

In principle, the K°R is open to anyone who is curious. To the extent that it is possible, a K°R promotes heterogenous composition of its visitor groups. Based on 2019 statistics, we had 4,100 visits, often lasting several hours, 80% were individual visitors while 20% were groups (school classes, German courses, apprentices, etc.). The largest proportion of visitors (45%) were children aged 6–12 years. Mainly these children were regular guests from the local area — often with a migration background and/or low socioeconomic status — who first visited with an adult and later independently. There are also targeted visits by (often socio-economically advantaged) families with their children coming from other districts or even cities. Young adults visit mainly through booked groups, especially from migrant communities who also look for opportunities to enhance their German skills. Random visits of passers-by complement this diverse visitor spectrum.

Besides the quantitative aspects of evaluation of the project, we incorporate a social science perspective through evaluation with a variety of methods implemented

[3]The project "Schau rein" (2016–18) was organized by ARGE KIWI.

[4]"Rayon Science" in Paris (since 2018) is a project run by the association TRACES.

from the outset, including participant observations, questionnaires, interviews and analysis of reflection protocols. For example, a recent study provided results on the learning process in the K°R. The observation that 97.6% of the children were actively involved in the K°R activity stations and over 56% explained something to others, was interpreted by psychology researchers as an indication of partaking and self-efficacy [Arkhurst et al., 2019]. All research findings are reflected in the project development and impact assessment. The pillars of effectiveness for the project are inclusion and equity, positive learning and innovation culture, as well as revaluation of the local areas.[5]

Knowledge°Room as a tool for advancing social justice

Research suggests that "participation in out-of-school science learning is far from equitable and is marked by advantage" [Dawson, 2017; National Science Foundation, 2012] and that science centres are not designed to include low-income, minority ethnic groups [Dawson, 2014a]. Along with the COVID-19 pandemic came profound challenges and choices to be made related to science and its complex relations with the community. In addition, in the wake of the pandemic and the resulting rise of inequality, the responsibility to encourage continuous learning becomes even more central. In May 2020, a few months into the pandemic, Dawson and Streicher [2020] pointed out that despite the fact that social justice is addressed by several organisations, "most current science engagement practices are not equitable and are marked by structural inequalities in content, staffing and audiences". This stresses the necessity of an "alternative framing" in the field of science communication and informal science education, by placing social justice "at the heart of our [science engagement] sector" [Dawson and Streicher, 2020].

We believe that social justice as a dimension of science communication is becoming of wider importance. Keeping this at the forefront of our minds may contribute to establishing settings which deliberately lower the barriers for science participation by people from socio-culturally disadvantaged groups. These barriers could be the distance of their home to a science or cultural venue, an entry fee, the style of the space or it could also be that language is used that is too difficult for learners of the local language. Some of our visitors told us that they are interested in increasing their understanding, but the language in a museum is complicated so they step back. Working with those excluded targeted groups with an inviting and open mind-set, may transform their self-affirmation and consequently improve their relations with the surrounding society. Science centres thereby can contribute to their communities' further development of social justice by providing activities for vulnerable groups, directly or through partnership with other organisations with expertise in this field.

In the K°R, three fundamental pillars were established to reuse and invigorate often neglected spaces, thereby fostering social inclusion:

Accessible space. One of the main and emphasized characteristics of the K°R is its accessibility. It is free of charge, there is no need for individuals to register and most importantly it is located in disadvantaged urban areas where the population

[5]Revaluation includes empty premises in economically underserved areas turning into lively spaces which people from the neighborhood recognize and value, enhancing attractiveness of the area.

participates less (if at all) in science communication offers or museum visits. The use of empty shops in those areas is seen as an indicator of urban regeneration and development. For example, feedback from people in the neighbourhood was that this opportunity in their district "facilitates dialogue and awareness and is considered a safe and open place for the community".

Another aspect of the accessibility of the K°R is its simple rules as well as the language which is used. There are no long and overly difficult to understand explanations to read for the exhibits, which might discourage participants and lead to them disengaging. Instead, the atmosphere in the K°R provides a comfortable environment and simple German texts suitable for all ages and educational levels, so participants can use the activities even when lacking confidence in German or specific areas of knowledge. A young adult who visited the K°R pointed this out: "I did not know that I can participate and have interaction in a scientific topic although my German is not good. But in K°R it felt easy to understand the explanation from the team as well as share my own experiences with them".

Space for public participation. It is over three decades since Thomas and Durant [1987] brought up the question of "Why should we promote the public understanding of science?" Since then there has been growing recognition of the need to shift from understanding to engagement with the public [Stilgoe, Lock and Wilsdon, 2014]. In the K°R, we see that people who share their interests and ideas develop a deeper connection to the space. This provides an opportunity for collaboration with community members, which promotes long-term engagement and positive learning experiences.

Since the beginning, one of the main aims of the K°R project was to foster self-empowerment, building confidence in individuals and most importantly, to engage them in exploring science. The experience showed us that, true to our name "Knowledge°Room — a lab for curious people", many of our visitors started to see and label themselves as a "science person", i.e. "being curious and interested in science, knowing something and being able to explain or help other visitors in experiments and tinkering activities" [Streicher, Unterleitner and Schulze, 2014]. Some months after opening the current K°R in the fifth district of Vienna we had around 10 regular visitors (age between 8 to 16) who became 'junior explainers'. They saw themselves as part of a team, welcoming and interacting with other visitors and most importantly trying to explain to others what they had learned. Although the quality of scientific explanations varied among them, all of the 'junior explainers' gained self-confidence and felt included. Another example, is that of a migrant woman who trained and then joined the K°R as a space for voluntary work, giving her the confidence and opportunity to remap her life and aspire to become a teacher. These examples reflect that "in the K°R, social inclusion and intercultural dialogue are not so much explicit goals, but rather casually develop through the hands-on science activities" [Streicher and Schulze, 2018].

Space for encounter. The K°R is hosted by two science communicators (explainers), who have a crucial role besides facilitating science centre activities, making visitors feel welcome, connecting and encouraging participation. Our multilingual and multicultural explainer team is precisely educated to promote intercultural encounters in a respectful atmosphere and encourage cooperative

learning experiences. Science communicators in the K°R are not just role models regarding science curiosity and enthusiasm, but often for the regular visitors they are also trusted contacts with whom they can and eagerly share their personal stories.

In addition, we provide particular resources such as discussion games which lead to conversations among visitors. The explainer team also aims at engaging in a reflective conversation with visitors to understand their intellectual investments and achievements as well as their challenges with different activities during their visits.[6] Through this kind of encounter, visitors experience directly or indirectly through self-reflection a boost of confidence in a public sphere and an improvement of their communication skills. In other words, not only do the visitors learn new things, but the K°R also enables them through the possibility of interactions, to produce and narrate their own content which is related to the world around them.

These activities frequently connect the K°R not only to individual visitors, but with various communities, as visitors return bringing their friends and family to show them what they have discovered at this venue. We often see that the learning motivation increases when there is also time and space for developing personal relations.

"It does not touch our heart" vs a bottom-up approach

The above-mentioned three pillars are important to place social justice at the "heart of our sector" of science engagement [Dawson and Streicher, 2020]. However, for social justice to become true, our operative actions have to "touch the heart" of the community towards which it is directed. In the following section we present an example of how to go a step further into a neglected space by an approach atypical to the traditional repertoire of science centres. This includes not just guiding the audience from passive to active actors, as is common in all science centres through hands-on exhibits, but also including the participants in creating the goals, methods and processes.

In this example, the science centre does not prepare a topic (which reflects our interests) and develop the associated communication strategy (tailored to our assumptions of a community). Instead, the centre facilitates the opportunity for the participants to find a topic which they associate with science and their lives. The participants are thereafter encouraged to implement an event for the science topic they selected. In principle, this is a 'bottom-up' approach which may look different to 'traditional' science communication and the following example sheds more light on K°R's experiment with this approach.

In early 2019, K°R Vienna started a collaboration with the migrant community encouraging them to provide us with ideas of activities to involve their groups in our science centre. As a first step, H. Habibi who already had connections with the Afghan/Iranian migrant community, knowing their culture and language, started his fieldwork to introduce the migrants to what we were trying to do. The first challenge came very early as the participants (aged 16–55, from Afghanistan and Iran) of the community started to ask what a science centre is. The first two

[6] An already studied methodological approach known as "registers of engagement" discussed by [Smith, 2011].

sessions with the group, which took place at the K°R, were spent drinking tea and talking about the purpose of science centres. Trust was a central matter and the participants wanted to know exactly whether K°R was involved in "political activity which might affect us?" or if "this activity has an effect on our migration process?" and so forth.

After two "get to know each other" meetings, we started the second step by suggesting and encouraging the group to provide an activity focused on various aspects associated with a calendar system in the spirit of the science centre's setting. We thought that a calendar was something important in all cultures, vary throughout the world and are based on different calculations and cultural events, so the group may be interested in it. But, after presenting this idea to the group, they expressed that this subject "does not touch our heart" (i.e. they were not passionate about it).

After three months working with this particular group, K°R reconsidered the approach and changed its strategy to instead encourage the group to come up with their own idea of topic as well as setting, which boosted their motivation significantly and mobilized the group. Suddenly, they brought forth diverse and fascinating ideas. The result was that in May 2019 the group organized an intercultural "event" in the K°R called the Khayyam-Evening (focused on a Persian scientist living in the 11th century). The event was accompanied with music and poetry — completely different from "traditional" activities associated with science communication.[7] The group did research on the scientist and gave speeches focused on his work, art and life — in German, Persian and English. People in the group with a wide variety of different educational backgrounds (some were home based with childcare responsibilities, while others had master's degrees and were in Ph.D. programs) worked enthusiastically with each other.

In this experiment, we shifted to a bottom-up approach by providing K°Rs full support to the group as well as the opportunity to create their preferred subject and implementation of an event. Our conclusion is that this approach brought unexpected and unpredictable results, which in hindsight turned out to be very innovative. It also showed the benefits of this very open approach to science communication, which is not typically included at science centres, but may be beneficial in creating participation amongst similar groups in the future. Additionally, this experience created a trust-based connection with an immigrant community and curiosity amongst them, which led to some participants later visiting the K°R on their own and engaging with our other science centre activities.

Conclusions

As individuals and societies, our ways of understanding and responding to science are deeply impacted by our perspectives from non-science domains, meaning that they are formed by the cultures and contexts in which we interact. This is what Jasanoff [2003, p. 223] discussed when she wrote about the public and its relationship with science: "we are not all alike but are guided by culturally conditioned 'civic epistemologies"'. The K°R aims at inspiring public engagement through creating opportunities for exchange of ideas, perspectives and most

[7] Featuring non-Western science in its relation to arts and culture is illuminating another space we mostly tend to neglect [Orthia, 2020].

importantly science while including all within society. This approach can assist in creating an empowered public, with or without a background in science, who are encouraged to contribute to understanding the world and reflecting on questions as well as answers.

In this commentary we elaborate on our experiences in the K°R seeking to promote social justice by expanding neglected spaces towards accessibility, public participation and encounter [Dawson, 2019]. We also suggest that in order to go further in reaching social justice through science engagement, we should not just put this idea in the centre of our institution, but also put communities in the centre of our space. This includes building trust, dialogue and most importantly letting the community create and narrate their own story to access a particular area of science relevant to them [Brown, Roche and Hurley, 2020; Orthia, 2020].

In conclusion, the impact of science-society interaction will increase if the socio-cultural relevance for the participating group is taken into account when planning activities and events, here exemplified by interactions with a particular immigrant group. This may also be the case for other disadvantaged groups in society. K°R is going to continue its commitment to the idea of social justice by responding to the different demands of various communities. We intend to expand our activities to stimulate increased public science engagement in a more inclusive and equitable way, whilst further discovering neglected spaces.

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