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Public engagement with science: a novel researcher-led collaboration with a major UK science centre

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ABSTRACT
Science communication is a key component of the academic process. Science centres provide researchers with an opportunity to convey their findings directly to the public, who in turn can be sure that they are receiving information from a trusted source. Therefore, this paper focuses on a new researcher-led public engagement project situated within a major UK science centre. The project utilises three freestanding digital touchscreen kiosks that provide visitors with the opportunity to learn about science through active participation (e.g. interactive research studies) as well as through more traditional knowledge exchange routes (e.g. static images with text), and it tested the effectiveness of onscreen QR codes as a means for maintaining public engagement beyond the initial kiosk experience. Data collected from nearly 10,000 visitor interactions demonstrated a preference for the interactive activities (5,000 complete datasets were collected) over the more traditional passive knowledge exchange content, and the QR codes were shown to provide a promising route to continued engagement. We recommend this approach to scientists, educators, and designers, seeking to develop an effective, practical, updatable, and cost-effective public engagement exhibit within a public science space.

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Introduction

Science communication and knowledge exchange have become core components of the academic infrastructure (Calice et al., 2022; Baram-Tsabari & Lewenstein, 2017; Poliakoff & Webb, 2007). The promotion of scientific findings can be key to affecting policy changes, updating practitioner approaches, and disseminating the positive impact of taxpayer funded research on society (Bubela et al., 2009). In recent years, the media, and in particular, social media platforms, have become the primary source of science information for many people (Huber et al., 2019; Su et al., 2015). Such platforms offer an unprecedented opportunity for researchers, media professionals, and individual bloggers to transform complex scientific outcomes into easily understandable pieces of information (Brossard, 2013). However, it has been reported that science misinformation is increasing across the digital media landscape (West & Bergstrom, 2021), and there is growing concern among academics

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about the lack of quality control available to them, in relation to the dissemination of their research in this way (Weingart & Guenther, 2016). Therefore, it is more important than ever that scientists have access to, and make effective use of, direct and trusted routes to knowledge exchange. Science centres provide that critical opportunity.

Modern science centres occupy an important role in the fabric of most major cities (Falk et al., 2016; Reich et al., 2007). Their emergence, in a UK context, was due in part to concern about decreased public engagement with science, and the role that they could have in providing a place of informal learning for children and adults (Heath & Vom Lehn, 2008). The evidence suggests that this role is effective, with research showing that visiting a science centre can have a positive impact on attitudes towards science (Şentürk & Özdemir, 2014), and the value placed on the impact of science on society (Jarvis & Pell, 2002). In addition, such visits have been shown to increase interest in pursuing a science-based career (Jarvis & Pell, 2005), feelings of engagement with public policy (Bandelli & Konijn, 2015), and the application of scientific information learned during the visit to situations encountered in everyday life (Guisasola et al., 2009; Medved & Oatley, 2000).

Importantly, and in contrast to traditional museums which utilise passive learning techniques (e.g. explanatory text boxes), a science centre seeks to involve visitors in exhibits as active participants (Duan et al., 2021). This active participation approach is likely to be a key driver in the success of their knowledge exchange (KE) programmes, and it is supported by established theoretical frameworks from educational psychology. Research has shown that interactive learning methods confer a knowledge exchange advantage over traditional passive information acquisition approaches (Markant & Gureckis, 2014; Nguyen et al., 2021; Prince, 2004). Kappel and Holmen (2019) describe this distinction within the present context as; the public participation, or 'citizen science', approach (i.e. active learning and engagement; here we refer to 'citizen science' as providing the opportunity for the broader public to engage in real science experiments and to help shape new projects; see Eitzel et al., 2017; Vohland et al., 2021), in contrast to traditional dissemination paradigms (e.g. passive learning via media content). However, individual differences in learning styles might mean that, for some people, passive learning approaches are still preferred (see Minhas et al., 2012). Therefore, further assessment of user preference for active vs. passive knowledge exchange content is necessary to continue to inform this debate, and to provide guidance for content developers.

In addition to providing a trusted knowledge exchange conduit, science centres also provide the opportunity for citizens to take part in, and feel part of, live real-time science projects (see Heath & Vom Lehn, 2008). In setting up scientific studies in such spaces, researchers can both collect data, that is publishable (e.g. Cartwright-Finch & Lavie, 2007; Robertson et al., 2020), and disseminate the rationale and impact of the work to a diverse visiting public. This latter point, on the diversity of the visitor cohort is an important one, in relation to the quality of the data collected, the generalisability of the findings, and to the scope of the knowledge exchange impact. For example, it is common in the social sciences (e.g. psychology) for participant recruitment to occur primarily via the undergraduate student cohort, often in return for course credit. Such samples are therefore often restricted to the demographic of the 18–21-year-old university student, which in some cases can constrain the generalisability of the findings to the wider, more demographically diverse, population (see Sugden & Moulson, 2015). In contrast, while there is still work to be done in relation to accessibility and representation (Archer et al., 2016; Dawson, 2014; 2018), public science centre visitor cohorts can provide access to a more representative section of wider society, and gaining access to such participants, provides a prime opportunity to increase the ecological validity of a research project.

Taken together, the research described above points to a key role for science centres as trusted conduits for science communication, as effective promotors of the value of science in society, and as data collection opportunities. However, links between academics, universities, and science centres can often be informal and irregular, with researchers often contributing one-off workshops for specific events. In addition, such workshops often do not include a built-in mechanism for maintaining contact with the user beyond their engagement with the event-specific activity. Therefore, in this paper we report on a recent successful public engagement collaboration between university researchers, research development staff, and the Glasgow Science Centre, one of the UK's major public science spaces. Our project aims were to provide visitors with the opportunity to engage with, and learn about, science by taking part in interactive research studies (i.e. active participation/citizen science), and/or by engaging with more traditional image and text-based content (i.e. passive learning through text-based information). In addition, as detailed below, we include a procedure to enhance the possibility of continued public engagement with participants beyond the initial visitor experience. The aim of this paper is to highlight this novel, replicable, and collaborative approach to public engagement using a practical, updatable, and cost-effective knowledge exchange exhibit.

To that end, we procured three modern digital touchscreen kiosks, see Figure 1. There is a growing literature on the use of interactive digital technologies in science centres (see Falk et al., 2004; Meisner et al., 2007; Li, 2022; Li et al., 2024), and in line with that research we opted for these 'hands-on' (i.e. touchable) digital kiosks as those with touchscreen functionality are more likely to attract and hold a visitors attention (see Li, 2022), than 'hands-off' (i.e. display only) digital screens. In addition, for practical reasons, they would also allow us to regularly and remotely (i.e. from university workstations) update the content, and similarly, given the rise in touchscreen technology in general (e.g. smartphones, digital tablets), we believed that this was an interface that most users would be familiar with. Using university and science centre research development and public engagement support services, we created an engaging visual interface that provided visitors with a four public engagement options. Each of the four options were available on each of the

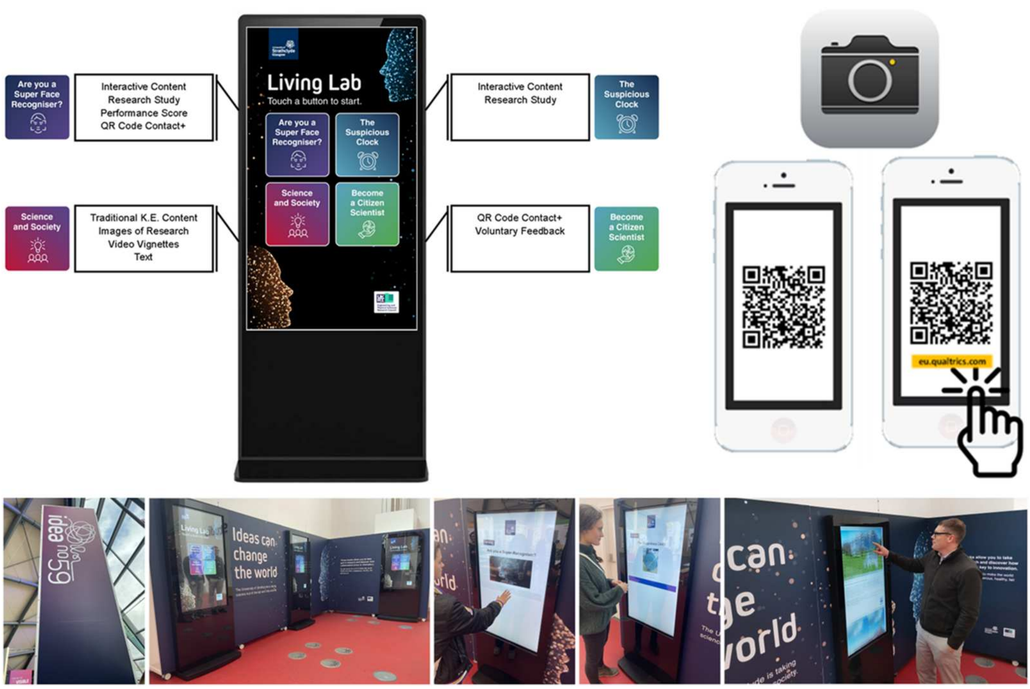

Figure 1. Note. [Top Left] Shows a kiosk display homepage with text indicating the content within each option. [Top Right] Shows the QR code procedure we used to maintain contact with visitors beyond their visit to the science centre. Users could scan these onscreen QR codes using their smartphone to sign up for research specific or more general citizen science mailing lists. [Bottom] Images from the actual exhibit space. The text on the kiosk frames reads 'Ideas can change the world; The University of Strathclyde is taking science out of the lab and into society; These kiosks allow you to take part in research and discover how collaboration is key to innovation. So, join us as we work to make the world better-educated, prosperous, healthy, fair, and secure'. Appropriate photographic consent was provided by the participants included in the images.

kiosks, they were not presented or accessed in any pre-determined or sequential order, users simply selected each of the options that they wished to engage with. They could return to the homepage and select another other option at any time.

Two of the content options were interactive ethically approved current research studies. These supported our aim of providing visitors with the opportunity to actively engage with, and learn from, current science projects. In addition, from the researcher point of view, the aim was to assess the extent to which complete and useable datasets could be collected via this novel touchscreen setup (i.e. active learning; data collection; real time science). The first active participation research study was 'Are you a super-recogniser', a face recognition task, included because of the project team's research interests and public interest in such work, which would take approximately 5–10 min to complete. For the second research study, we presented 'The suspicious clock', a pareidolic emotion detection task (i.e. detecting emotional configurations in non-face stimuli, e.g. in a clock face, clouds, buildings). In these studies, participants made touchscreen responses to visually presented content, they could receive feedback scores, and each study embedded public engagement content within it to ensure that each person learned the rationale and impact it could have in the real world (e.g. use of super-face-recognisers in policing; see Davis & Robertson, 2020; Robertson et al., 2016). On completion of each study, participants were presented with an onscreen QR code that could be scanned by their smartphone to sign up for a new face recognition research mailing list. Inclusion in this list would provide updates on the latest research findings from the university, and opportunities to take part in future campus-based studies. In this way, we created an embedded digital mechanism for continued public engagement beyond the initial exhibit interaction.

The remaining two options were geared towards providing access to more traditional passive knowledge exchange information via the 'Science and Society' section and encouraging users to sign up to our more general 'Become a Citizen Scientist' mailing list. For 'Science in Society' (i.e. passive learning; knowledge exchange; science communication), users were provided with three options: view research impact spotlights (i.e. images and text), view research impact videos (i.e. short vignettes with subtitles detailing the positive effects of University of Strathclyde research on society), or view information about other public engagement projects from colleagues who also received EPSRC funding during the same period (e.g. 'Protecting your personal data workshop', ' A narrative workshop for perspectives on breast cancer from patients, clinicians, and scientists'). For the 'Become a Citizen Scientist' option, as seen in Figure 1, this is where visitors could learn about the 'citizen science' concept and some of the potential research methodologies (e.g. electroencephalogram (EEG) recording of brain activity) that could be available to them, if they chose to sign up for this more general mailing list using a further onscreen QR code. This option also displayed a touchscreen button to provide voluntary feedback on the user's experience of the exhibit.

This version of the exhibit was available to science centre visitors for an initial 6-month period, and below we report the outcomes from nearly 10,000 user interactions collected via the three touchscreen kiosks during that time. As our intention is to show how a researcher-led public engagement exhibit can be created for use in public science spaces, we report both on the practical aspects of the project development (e.g. cost, set-up), as well as the content-based outcomes (e.g. active vs. passive content preference).

Materials and methods

Exhibition design and content options

The exhibition design was created through collaborative discussion between the science centre staff and the academics, drawing upon the experience of the science centre staff in creating engaging displays and to ensure a good fit with the overall style of the science centre space (see actual exhibit images provided in Figure 1). For the content options, please note that although we label the content available to users as Options 1–4 below, we do that simply for ease of description. The four content touchscreen icons were not numbered, only their titles were visible, visitors could select any option in any order, and no option, other than the voluntary feedback survey, was contingent on having completed another. We provide example content displays for reference in Figure 2, and we provide information on each content options in the accompanying text.

Active participation content

Option 1

Are you a super face recogniser? This is a real science experiment that speaks to the active learning, engagement, and data collection principles noted in the introduction. Participants take a short 5–10 min face recognition test which, as seen in Figure 2, asks them to decide whether two unfamiliar faces show the same person or two different people (see Burton et al., 2010 for full details on the 'Glasgow Face Matching Test'). Each participant receives their accuracy score at the end of the study, and a full onscreen debrief detailing how this research has an impact on suspect identification, for example, in real world policing (see Davis & Robertson, 2020; Robertson et al., 2016). To maintain study-specific contact beyond this initial visitor experience, participants were provided with the opportunity to join our face recognition research e-mail list by scanning an onscreen QR code with their smartphone, which directed them to a webpage where they could enter their details.

Figure 2. Note. Example onscreen content for active participation research studies [Top Left Option 1 'Are you a super face recogniser?'; Top Right Option 2 'The suspicious clock'], and for the more traditional passive information content [Bottom Left Option 3 'Science and society'; Bottom Right Option 4 'Become a citizen scientist']. The copyright information for the pareidolic image shown [Top Right] is Bazar del Bizzarro, CCBY-2.0 Attribution 2.0 Generic, https://creativecommons.org/licenses/by/2.0/, https://tinyurl.com/2zr546ty (Flickr), other than re-sizing, no further alterations were made to the image.

Active participation content

Option 2

The suspicious clock. The second active participation research study was named 'The suspicious clock', as the focus of the experiment was on detecting the presence of a face and an 'emotional expression', see Figure 2 for an example, in a non-face, 'pareidolic', object. In other words, in relation to the title, participants may attribute the human response of suspicion to a clock face based on the position of the clock hands and the position of the clock digits. This study could be completed in 5–10 min and at the end users would receive a full debrief providing them with an opportunity to learn about individual differences in face perception and processing, and how their own response frequency highlighted that scientific concept (see Noble et al., 2023).

Traditional passive content

Option 3

Science and society. Here we presented image, text, and video content which highlighted the positive impact of University of Strathclyde research on society (e.g. new technologies to address climate change, harnessing diverse learning communities to enhance environmental sustainability, addressing the antibiotic crisis, novel techniques for stroke rehabilitation, and work on new quantum encryption solutions to prevent digital fraud). This activity used the traditional passive learning approach. To that end, users were able to scroll through onscreen content produced by the University of Strathclyde Images of Research competition (images + text), and related short knowledge exchange 'research spotlight' videos presented with subtitles.

Traditional passive content

Option 4

Become a citizen scientist/voluntary feedback. In this option, users were provided with information on the citizen science concept, its importance to research, and the range of experimental methodologies they could engage with via campus-based studies (e.g. EEG, Galvanic Skin Response, Computer-based tasks). Then, again using the QR code/smartphone camera procedure, participants were informed that they could join this more general mailing list (i.e. separate to the face-specific research list) and in doing so, they would receive updates on research, public engagement, and participation opportunities from scientists from across the university (i.e. covering a diverse range of research interests). The Citizen Science option also contained a feedback button which visitors could use to provide responses to the following questions/statements: 'to what extent did you learn something new from this exhibit'; 'to what extent did the content enhance your understanding of the impact of science on society'; 'I would recommend this exhibit to others'; 'the touchscreens were easy to use'; 'the content was well presented and engaging'. Responses could be made via a rating scale ranging from 0 (not at all) to 10 (very much so). A final yes/no question was also included, which asked whether the user thought 'the exhibit should be installed as a permanent exhibit with additional activities and regularly updated content'.

Ethical considerations

All content received approval from the Ethics Committee of the University of Strathclyde Department of Psychological Sciences and Health (04/08/2022-A). For the active learning real science experiments in Option 1 and Option 2, both included all the standard requirements for ethically approved studies (i.e. information sheet, consent form, instructions, debrief). This version of the exhibit was aimed at those aged 16+, but in line with our ethical approval, those below the age of 16 were permitted to take part with the consent of the adult accompanying them to the science centre. At the end of both active participation research study options, participants were asked to input their age range to provide some demographic information. Importantly, all the display content was sourced from public domain/creative commons images and tasks that were free to use for research purposes.

Software and display set up

The research development staff created a webpage that hosted the kiosk display homepage and the JavaScript code that supported a 'return to homepage button' and 'timeout' functionality (i.e. if no touchscreen input had been received for 3 min, a countdown timer would appear for 30 s to allow the user to continue the session before the activity would automatically timeout and return to the homepage). Cascade style sheets were used to position the onscreen touchable elements, see Figures 1 and 2 for example displays. To project the content onto the kiosks, we simply used the inbuilt kiosk WiFi connection to connect to them to the webpage using the already-installed Microsoft Edge Internet Browser. We removed access to the browser navigation and scroll bars to both maximise and simplify the viewing area and to ensure that only the project content could be accessed. The four touchscreen options were created using Qualtrics (https://www.qualtrics.com/), which presented the onscreen content and collected the data for the active participation research study options.

Hardware, project cost and resource allocation

Three freestanding Scan FX L50E3-T infrared multi-touch interactive digital kiosks with 50-inch 1920×1080 pixel displays were purchased from MediaScape (https://mediascape.ltd.uk/) and installed within the Glasgow Science Centre. Importantly, the kiosks use a familiar operating system/internet browser (i.e. Microsoft Windows 10/Edge), they connect easily to WiFi, and the only cable-to-space requirement is a plug socket. The entire project was delivered for less than £14,000 (US$18,000). The purchase of the kiosks accounted for the largest expenditure, with research development IT support, and contributions to the science centre exhibit start-up costs accounting for most of the remaining budget. In terms of resource intensity for the creation of the displays, as noted above, the key content was developed by the researchers using the well-established Qualtrics platform. Other online platforms (e.g. PsychoPy) would also be compatible with the procedure described above. Beyond the initial content creation, the presence of a familiar operating system, web browser and survey platform (i.e. JavaScript, Windows, Edge, Qualtrics) allowed the project team to remotely update the kiosk content on a regular basis (i.e. from their campus-based office computer).

Results

Data collection

The pilot phase ran for a 6-month period between the 5th of October 2022 to the 31st of March 2023. We define 'visitor interactions' as the number of times an option was selected from the kiosk display (i.e. how many times did a user select that option via the touchscreen).

Outcomes

For the active participation research study Option 1, 'Are you a super face recogniser?', there were 6080 user interactions. For the active participation research study Option 2, 'The suspicious clock', there were 2086 interactions. For the more traditional passive learning content in Option 3, 'Science and society', there were 367 interactions, and there were 731 interactions for Option 4, 'Become a citizen scientist'. This produced a total of 9264 user interactions across the four content options during this 6-month period.

As outlined earlier in the paper, one aim of the inclusion of the active participation research studies, from the researcher point of view, was to examine the prospective quantity and quality of data collection that would be obtainable through these kiosks. The findings show that for Option 1, 'Are you a super face recogniser?', 66% of the 6080 interactions yielded valid and complete datasets. In other words, the participants completed the study from start to finish. For Option 2, 'The suspicious clock', 75% of the 2086 interactions produced valid and complete datasets. The combined proportion of datasets collected, and the age range distribution of participants who engaged fully with Option 1 and Option 2 are presented in Figure 3 below.

Extended engagement

During the pilot phase a total of 60 visitors scanned the onscreen QR code and entered their details to become part of our Option 1 face research e-mail list (40) or the more general Option 4 citizen science e-mail list (20).

Visitor feedback

While the number of user interactions and useable datasets indicates the popularity of the exhibit and its content, users were also able to provide explicit voluntary feedback via Option 4. A total of 21 visitors voluntarily completed all 6 feedback questions. Responses were scored on the rating scale from 0 (not at all) to 10 (very much so). Participants reported positive mean scores for each of the questions: to what extent did you learn something new from this exhibit ($M = 7$, $SD = 3$); it enhanced my understanding of the impact of science in society ($M = 7$, $SD = 3$); I would recommend this exhibit to others ($M = 7$, $SD = 3$,); the touchscreens were easy to use ($M = 8$, $SD = 3$); and the content was well presented and engaging ($M = 8$, $SD = 2$), and 76% of respondents

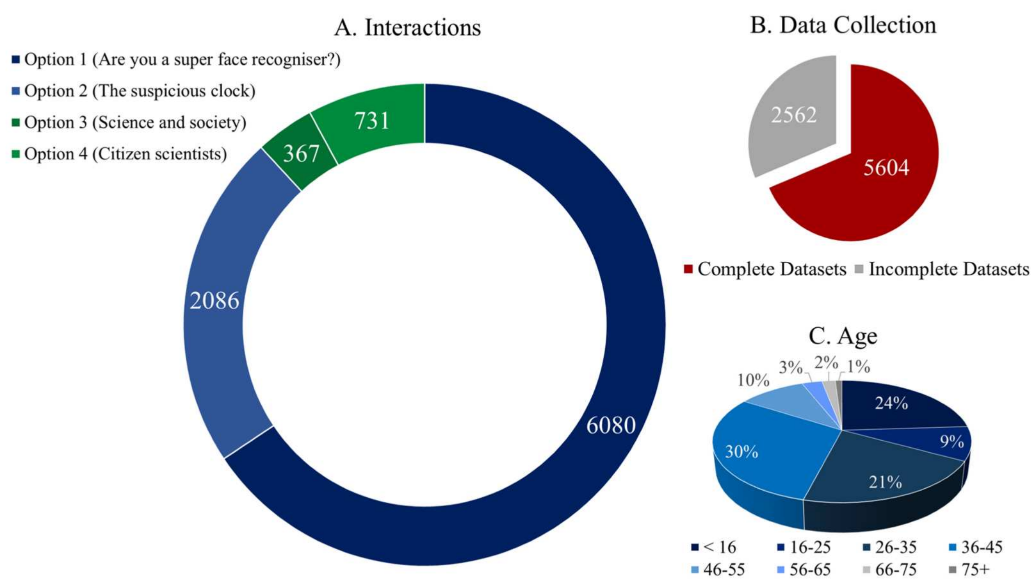

Figure 3. Note. (A) Shows the total number of interactions with each of the kiosk display options. Options 1–4 are colour-coded and presented in a clockwise order from vertical (B) Shows the proportion of complete datasets recorded from Option 1 and Option 2 combined. (C) Shows the combined proportion of age ranges recorded from Option 1 and Option 2. The youngest to oldest categories are presented in clockwise order from verticle.

indicated that they would like to see the exhibit be made a permanent feature at the science centre with additional activities and regularly updated content. The success of the project has led to a refreshed version of the exhibit, due to launch in October 2024, becoming a permanent part of the science centre, and as discussed below, it will incorporate more formal and qualitative feedback opportunities for users to ensure that it continues to meet the demands and expectations of as many visitors as possible.

Discussion

In this study we describe the development of a researcher-led public engagement exhibit situated within a major UK science centre. For a total project cost of under £14,000 (US$18,000), using software (e.g. Microsoft Windows, Edge) and methods (e.g. Qualtrics tasks) that are likely to be familiar to the typical researcher. Visitors were presented with the opportunity to actively learn about science by taking part in real research projects and to learn passively about the positive impact of science on society using engaging images and text. The initial 6-month period of operation generated nearly 10,000 total user interactions, over 5000 complete datasets, evidence of effective knowledge exchange, positive exhibit feedback, and support for our QR code procedure for maintaining contact with users beyond their initial interaction with the kiosk content.

As outlined in the introduction, the science centre experience is geared towards active participation within the space, and research suggests that an active approach confers a learning advantage over the passive assimilation of information (Duan et al., 2021; Li, 2022). However, given individual differences in learning style (Minhas et al., 2012), we were keen to include both interactive activities (Options 1 and 2) and more traditional science communication formats (Option 3) to assess user preference in this context. The findings show a clear preference for the interactive content, with 88% of user interactions being generated by the active participation research studies (Options 1 and 2), with significantly fewer visitors engaging with the traditional image/text content provided by our science and society and citizen science displays (Options 3 and 4). For this exhibit, we will now look to update the latter content to place it within a more interactive context (e.g. a quiz or game format). In more general terms, researchers should focus on incorporating this active learning preference into their own science communication activities (see Falk et al., 2004; Meisner et al., 2007; Li, 2022; Li et al., 2024), particularly where the research may have a behaviour change component (e.g. health psychology, climate change; see Bosnjak et al., 2020; Michie et al., 2013).

The data collection component of this study was designed to complement the feelings of engagement with research that science centres are known to support (e.g. Bandelli & Konijn, 2015; Jarvis & Pell, 2005). In addition, the ability to recruit participants beyond the typical undergraduate demographics, provides the opportunity for researchers to strengthen study outcomes and generalisability (see Sugden & Moulson, 2015). Here, our data shows that the exhibit generated a total of 5604 complete datasets, with a large range of individual differences in participant age, and enough statistical power to support an age group analysis. To put this level of engagement in context, within a typical 6-month academic period, the authors might expect to recruit 200–300 university undergraduate participants, of limited age range (e.g. 18-21), using traditional means (i.e. undergraduate participant pools as highlighted in the introduction). This data suggests that taking part in real research, particularly when performance feedback is provided (Option 1; see Li et al., 2024), can capture visitors' attention, and this in turn supports science in real-time. While we chose to focus on diversity in age during the pilot phase, it is now our intention to enhance the amount of demographic information that can be collected (e.g. ethnicity, gender, occupation, socioeconomic status).

A core aspect of this project was to give both researchers and the public a means of continuing with the research and knowledge exchange activities beyond the initial visitor experience. In this study we used onscreen QR codes for users to sign up for study-specific or research-general mailing lists. Sixty participants completed this sign-up process, and this provides the project team with a key communication conduit that can be used for three purposes. First, it provides the academics with the opportunity to e-mail members of the public with the latest outcomes from their research. Second, those receiving the information can be sure that the information comes from a trusted source. Third, these e-mails can contain invitations to take part in campus-based research studies, which involves the public directly with research at the university, and further supports targeted participant recruitment (e.g. high performers on the face recognition test).

While the optional feedback on the exhibit was positive in a variety of domains (e.g. learning new information, greater understanding of the impact of science on society, and ease of use), the response rate was low. This may be because providing feedback was not a mandatory part of any of the options, and we cannot discount a positive response bias as a result of this approach. While the voluntary explicit feedback collected here is limited, indirect measures (i.e. number of users interactions in a short 6-month period, number of complete task interactions/full datasets, and number of users actively signing up for the mailing lists) would also indicate a positive view of the exhibit from the users. However, in future research, we will implement an in-person qualitative interview process during peak visiting times and provide more accessible set of feedback questions by embedding them within each existing and new content option.

In addition to that, there are several further aspects of the current project that we would seek to address and improve going forward. For example, at present the options are largely targeted towards adults, we now intend to add content that would appeal to young children, including tasks that can be completed with their parents or with the adult accompanying them. Indeed, the wider incorporation of multi-person activities is important, as Heath and Vom Lehn (2008) note that co-participation, indeed collaboration (a key scientific concept), would further support learning and engagement in this context. We were able only to report the number of user interactions here, rather than the number of individual users, as one user may have selected each of the four touchscreen options. To address this, we will implement a new procedure to record how long an individual user spends at the kiosk, with more specific detail on their interaction with different content options, this will further support effective updates to the display going forward (e.g. maximum study duration).

Similarly, the research studies we included did not preclude the same person repeating the tasks if they wanted to. However, for some studies, it may be important to the research question that users only complete the task once, this can be achieved using a QR code/weblink to provide the visitor with a unique participant ID which they then enter on the kiosk display. Regularly updating the content with new studies, and, for example, via targeted updates such as the addition of a touchscreen option on sleep science for world sleep day, will be key to keeping the exhibit relevant for both new and returning visitors. Moreover, while it is the case that we utilised the visual display of the kiosks, they also contain speakers, and we now seek to develop some content that includes engaging sound stimuli that could connect to visitors own wireless earphones. Similarly, while we made effective use of QR codes to support citizen science mailing list sign ups, this process could also be used for other novel initiatives, such as allowing visitors to download 'meet the expert' science podcasts.

Finally, while we did capture general user feedback during their interaction with the exhibit, it is also important that we capture feedback *after* the visit, particularly in relation to whether the visitors are recognising and applying their new science-based knowledge to their everyday experiences (i.e. measuring impact; see Medved & Oatley, 2000). This we intend to do by developing the kiosk content to encourage additional recruitment to the citizen science database, and by creating a follow-up feedback questionnaire that will be embedded within our citizen science e-mails. These activities should help to demonstrate whether there is a measurable and meaningful impact of the display content on specific outcomes beyond the science centre space (e.g. in relation to behaviour change; for use in impact case studies).

To conclude, here we present findings from a successful public engagement collaboration between researchers and a major public science space. This paper is intended to provide scientists and institutions with a practical, cost-effective, example on how to create an engaging and sustainable research and knowledge exchange exhibit in partnership with a public science centre. We recommend this approach, which should generalise across a wide variety of academic domains, to researchers and public science bodies seeking to connect directly with members of the public and as a means of engaging regular citizens with real science.

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Ethics statement

This project received approval from the Ethics Committee of the University of Strathclyde Department of Psychological Sciences and Health (04/08/2022-A).

Declaration of interest statement

The authors report there are no competing interests to declare.

Data availability statement

A copy of the dataset used in the analyses reported in this paper can be obtained from the corresponding author upon reasonable request.

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