Experiential Posters: Theatrical and Improvisational Tools Aid in Science Museum Outreach

INTRODUCTION

In science museums, an exhibit’s adaptability to the user is critical for effective learning. Considering that the audience at a science museum can have a diverse academic background, designing an adaptable exhibit can be challenging. Science exhibit designers have tried to address this by incorporating opportunities for user interaction and participation within an exhibit (3).

Every spring at the Miami Museum of Science (www.miamisci.org), The Miami Project to Cure Paralysis at the University of Miami hosts the Brain Fair (www.themiamiproject.org/brainfair), an event that allows the general public to learn about neuroscience. We set out to design a participatory museum exhibit for the Brain Fair. We refer to this activity as an “experiential poster,” an alternative to a traditional 2-dimensional scientific poster. An experiential poster uses the methods of theatre, like staging and role-play, to create an installation for scientific learning in which learners “experience” and “act out” the sequence of events in a biological process of interest. We describe the use of an experiential poster to meet specific learning objectives. We also discuss its use in service learning and science outreach.

PROCEDURE

Students are more likely to engage with new content when they can relate to the subject (1, 2). With this in mind, we chose to focus our experiential poster on the taste signaling pathways by which our nervous system relays “taste” messages. To create this activity, which we named “Tasting the Message,” we used as a guide the learning objective we wanted to meet—following the exhibit, students should be able to describe in their own words how the experience of tasting food involves the mouth, the brain, and nerves connecting them. We designed our experiential poster so that students could take on the role of a particular taste and journey along the anatomical pathway for taste perception. Overall, we wanted to create a differentiated learning experience in which participants had the opportunity to interact with the information in several ways: talking to volunteer scientists, physical and visual representations, and role-playing. All of the above areas incorporated improvisational and theatrical elements. The different elements in the experiential poster are referred to below as the “installation” (Appendix 1, 3).

Upon their arrival at the installation, students were met by a volunteer scientist who introduced them to the subject (Appendix 2, Fig. S2). Students were able to decide what kind of taste message they wanted to impersonate—sweet, salty, or sour. For simplicity, we limited the number of flavor messages that could be acted out to three. Each flavor was assigned a color—red, blue, or green. Based on this color scheme and their selection, students were asked to select appropriately colored flavor molecules from a box containing colored Easter eggs. Differently colored Easter eggs represented the molecular components of each flavor. Students were then directed to an area with easels displaying three different ancillary posters (Appendix 2, Figs. S3–S6), where their volunteer scientist discussed what happens during flavor perception at the level of the tongue and taste buds, the facial nerves, and the brain. Students were then directed toward the stage to act out, by bodily movement, the signaling sequence that takes place during taste perception (Appendix 2, Fig. S7).
The stage was an area with a floor map and props, where students could pretend to be the “taste message.” The floor map (Appendix 1) depicted the anatomical context of taste perception, including a taste bud, one of the facial nerves, the brain, and its gustatory cortex. It was created using Adobe Illustrator and then printed in a large format (6 × 10 feet) so as to create an area students could walk on to act out the trajectory of taste messages. Additional props helped students understand concepts of the signaling pathway, such as differently colored buckets representing the different types of flavor molecule receptors on taste bud cells (Appendix 2, Fig. S7). Participants acted out how the message starts with a flavor molecule associating with a receptor on cells in our taste buds (placing their egg into the appropriately colored bucket), how this then triggers an “electric” response that travels out of the taste bud, into the neurons composing the facial nerves, and up to the region of the brain responsible for taste perception, the gustatory cortex (participants walked, pretending to be “electric,” moving away from the taste bud, along the facial nerve and into the brain; Appendix 2, Figs. S8–S10).

Upon completion of the activity, participants were interviewed to assess whether the learning objective had been met (Appendix 2, Fig. S11). Participants were asked two different questions: “What did you learn in this activity?” and “What more would you like to know about this?” Approximately 200 participants were interviewed. More than 50% of those eight years or older were able to answer the first question and describe in their own words how the experience of tasting food involves a response starting in the mouth and traveling to the brain, via the nerves connecting them together (Appendix 4). Fewer of them articulated additional questions they would have liked answered (Appendix 4). Judging from responses to the first question, the exhibit accomplished the learning objective with a higher rate of success among older students and adults. While we attempted to differentiate the learning experience for both older and younger students, younger students with no previous knowledge about the topic were generally unable to explain or describe what they had learned from the experience. Future experiential posters will include additional modifications to tailor the experience for younger students and introduce them to the critical questions. These modifications might include volunteers being prepared to provide background information on the subject without using ancillary posters (or with specially adapted ancillary posters).

CONCLUSION

Through the work described above, a group of scientists created an activity for the general public that united elements of theatre and improvisation with scientific knowledge. The activity was successful in that it created a memorable learning experience, and in that participants were able to describe the biology of taste perception. Creating this activity allowed us to polish our skills in science communication and public outreach. For example, the challenge of simplifying sophisticated content for lay people helped us find new ways to eliminate unnecessary jargon while preserving the critical vocabulary and content.

A class interested in service learning could do similar work. Under their instructor’s supervision, students could design an experiential poster to increase the scientific literacy of an audience. For example, students in a microbiology, cell biology, or genetics course could prepare an experiential poster for the local science museum. In these examples, students would reinforce the new content they have learned while conveying science concepts to the community in an accessible and memorable way.

SUPPLEMENTAL MATERIALS

Appendix 1: Figure S1: Map of the “Tasting the Message” installation
Appendix 2: Figures S2 through S11: Pictures of the different elements and areas of the installation
Appendix 3: Table S1: Chronological list of student experiences at the installation
Appendix 4: Table S2: Representative student responses to reflection questions

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REFERENCES

