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ACTION-RESEARCH

Benefits of Community-University Partnerships in Rural Settings: Lessons Learned from an Inclusive Science Day Event

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This article reports findings from an Inclusive Science Day event that was hosted at a rurally located discovery museum. The event was collaboratively planned and hosted by two undergraduate student organizations from a local university. The university students planned eight inclusive science stations that were supplemented by six museum-developed stations. Each station was planned to meet the needs of a variety of learners. The event was very well attended, with approximately 150 visitors who ranged in age from infants to older adults. The research study reports findings from a survey of 22 caregivers who attended the Inclusive Science Day event. Findings present relevant information about the benefits of embracing a community-university partnership model and suggestions for facilitating a collaboratively planned inclusive science event. The implications highlight the importance of inclusive informal learning practices and partnership development in all locales. While the research is particularly relevant for rural stakeholders, it also provides useful considerations for all settings.

Keywords: community-university partnerships; informal learning; rural education; inclusive science learning; pre-service teacher education

Informal learning opportunities are often scarce in rural locations (Dawson, 2014; Hartman, Hines-Bergmeier, & Klein, 2017), and informal learning events that are specifically for children with special needs in rural areas are exceptionally rare (Nagle, Hernandez, Embler, McLaughlin, & Doh, 2006). However, informal learning settings provide an important link between school and out-of-school learning and are valuable partners in supporting PK-12 learning objectives (Bell, Lewenstein, Shouse & Feder, 2009; Ng-He, 2015). This manuscript presents finding from an inclusive science event that was hosted at a rurally located discovery museum in a Midwestern state for children of all ages. The event, hosted in partnership with 18 teacher education majors from a local university, presents an innovative collaborative model that maximizes the resources of all partners and is useful for informal learning practitioners and teacher educators in all settings. Survey findings from 22 caregivers who attended the event reveal important implications about planning and implementation that are beneficial for examining the perceived value and defining characteristics of successful collaboratively planned inclusive events, as well as improving rural accessibility to informal learning opportunities via community-university partnerships. While useful for informal learning practitioners in all areas, the implications for improving programming via community-university partnerships are especially relevant for rurally located informal learning providers.

Review of the Literature

Rural Informal STEM Events

Despite nearly 20% of Americans living in rural areas (U.S. Census Bureau, 2014) and rural areas offering rich research opportunities about STEM pursuits (Avery, 2013; Avery & Kassam, 2011), a scarcity of educational research in rural areas exists (Arnold, Newman, Gaddy, & Dean, 2005; DeYoung 1987; Hartman et al., 2017; Waters, Howley, & Schultz, 2008). While rural settings are known for their natural beauty and abundant access to outdoor informal learning pursuits (e.g. state and national parks, natural resource areas), rural

locales often present limited access to traditional indoor STEM learning sites such as museums, planetariums, and aquariums (Dawson, 2014; Hartman et al., 2017; Showalter, Klein, Johnson, & Hartman, 2017). Twenty-six percent of museums are located in rural areas, yet some rural areas experience large museum deserts (IMLS, 2014). Although the value of outdoor experiences in providing informal STEM learning opportunities should not be devalued in rural areas, the need for increased access to indoor informal science learning opportunities in rural settings is clear.

Hosting informal events in rural areas may offer unique challenges to organizers. For many rural areas, especially in rural impoverished areas, funding presents a significant challenge. While organizers of many informal learning opportunities try to keep admission costs low to increase equitable access to events, the strategy may undercut funding for staffing, supplies, and essential overhead costs such as rent and electricity (Hartman & Hines-Bergmeier, 2015; Tlili, 2008). In rurally located informal learning settings, event organizers also struggle to increase attendance and to effectively market to and attract attendees from a region's most rural areas (Hartman & Hines-Bergmeier, 2015). Informal learning researchers have long known that visitors need to feel comfortable and safe in the informal environment (Anderson, 2004; Falk & Dierking, 2013), and rurally located museums may face additional barriers related to establishing credibility as education providers and overcoming caregivers' discomfort in formal education settings (Hartman & Hines-Bergmeier, 2015). Despite challenges, rurally located places of informal learning are capable of offering significant connections to in-school learning objectives and of attracting visitors who feel uncomfortable in traditional school settings (Parsons, Hartman, Hines-Bergmeier, & Truly, 2017). Informal learning settings that are hosted within community-based locations, as opposed to potentially intimidating university settings, may further help to ameliorate accessibility barriers (White, 2010).

Inclusive Science Education

Although contemporary educational reform documents place great emphasis on the importance of quality science education for all students (National Research Council, 2012; Next Generation Science Standards Lead States, 2013), students with disabilities underperform on standardized science assessments and are underrepresented in science fields (National Assessment of Educational Progress [NAEP], National Center for Education Statistics [NCES], 2016; National Science Foundation [NSF], 2013). Among the most pressing barriers to achievement in science for students with disabilities is lack of teacher preparation (Kahn & Lewis, 2014; McGinnis & Kahn, 2014). It is therefore incumbent upon teacher education programs to seek out opportunities for science and special education students to gain instruction and experience to make science accessible for all students.

Informal science spaces can provide unique opportunities for teacher candidates in that they allow for multiple opportunities for presenting and reflecting upon lessons while working with diverse visitor populations (Dani, Hartman, & Helfrich, 2017; Duran, Ballone-Duran, Haney, & Beltyukova, 2009; McGinnis et al., 2012). Informal settings may offer teacher candidates the opportunity to host and plan science events in nonthreatening settings with supportive structures that help facilitate comfort with science content (Dani et al., 2017; McGinnis et al., 2012). Science teachers often feel underprepared to teach students with disabilities in their classrooms, and special education teachers feel similarly unprepared to teach science (Irving, Nti, & Johnson, 2007; Kahn & Lewis, 2014), making informal events that allow both groups to collaborate provide valuable experiences. Informal science learning events also provide teacher candidates with the unique opportunity to interact with caregivers (Dani et al., 2017; McGinnis et al., 2012). For these reasons, an inclusive science day project was initiated to foster a symbiotic relationship between a university teacher education program and a discovery museum.

The Inclusive Science Day Event

After crossing paths at a variety of science-focused events in the community, a university faculty member who advised a local university's undergraduate National Science Teachers Association organization proposed the inclusive science event to museum representatives (e.g. board members and museum staff/educators). As an informal learning organization in a rural area, museum representatives were well aware of the merits of pursuing collaborative partnerships and were very enthusiastic about pursuing the idea. In the past, engaging in collaborative partnerships allowed the museum to capitalize on local expertise, share resources, and to further the museum's mission of providing accessible learning opportunities for the region's children and youth. As such, developing collaborative partnerships within the region was a foundational goal of the museum.

With a desire to provide informal service-learning opportunities for students and to show students the value of partnering with a local organization, the university faculty member moved forward with the plan to work together and invited the participation of another university organization, the Student Council for Exceptional Children. After researching funding options, a small amount of funding via the university's community outreach and engagement center was obtained to support the event. The goals of the event were threefold: 1) Plan and implement a successful inclusive science event for the region's rurally located children and their caregivers utilizing a community-university partnership model; 2) Develop best practices for implementing future inclusive events via a partnership model; and, 3) Foster an awareness of and value for informal learning settings in teacher candidates.

Collaborating with the discovery museum and other faculty from the university, 18 science and special education teacher education majors planned the event. The university students planned eight science stations to be inclusive of a host of special needs, including visual, small and gross motor, learning, and aversion to sensory/tactile experiences. Stations were focused on providing attendees with hands-on opportunities to experience science content in an engaging and interactive manner. Examples of stations included creating a Galaxy in a Jar, Fingerprint Detectives, Blobs in a Bottle, and Making and Testing Kazoos. The museum supplemented the university students' eight stations with six additional stations that were also sensitive to inclusive practices (see **Table 1**). After working with university instructors with science and special education expertise and a museum-based educator, students thoughtfully planned activities that would meet a variety of students' learning needs. For example, for Blobs in a Bottle, students provided special "jelly blobs" to accommodate visitors who were unable to see the blobs. At the kazoo station, visitors who could not hear the kazoo's sounds were encouraged to feel the vibrations of the rubber bands and waxed paper. Where needed, all stations also had adaptive scissors, magnifiers, gloves, multi-sized equipment, and precut materials.

To increase accessibility in an impoverished region, all partners decided the event should be free. Additionally, it was targeted to learners of all ages and was held during the museum's regular Saturday hours. The event was advertised through sponsored Facebook advertisements, fliers in public forums, at community events, and through take-home fliers for local K-12 children. Both the museum and the university student organizations contributed essential components that helped the event be successful. For example, the museum provided a recognizable and trusted venue for the event, helped provide professional

Table 1: Inclusive Museum Stations.

Station Name	Description	Inclusive Considerations
Green Screen Exploration	The green backdrop in this station disappears when visitors choose a background.	Changeable backgrounds featured settings that portrayed diverse experiences.
Scented Sensory Station	Homemade spice-scented playdoh with a variety of cutting tools were available at the sensory station.	Scented materials provided an additional way for visitors with vision or tactile needs to engage.
Walk In Kaleidoscope	The larger than life kaleidoscope uses people as the kaleidoscope's beads to create millions of you.	The exhibit swings open to allow it to be fully wheelchair accessible.
Water Xylophone	Vases of different heights with colored water allowed visitors to play a full octave of music.	The water and song cards were color coded to allow visitors of all abilities to play music.
Puppet Theater	The puppet theater was filled with animal themed puppets.	Puppets in a multitude of sizes allowed visitors with a range of motor abilities to use them. Some puppets allowed for advanced manipulations, while others were simple finger puppets.
Butterfly Chromatography	Visitors used coffee filters and markers to separate the markers' colors. With pipe cleaners and clothespins, the experiment became colorful butterflies.	Easy grasp clothespins, large droppers, and unscented markers were used to increase accessibility for visitors with fine motor disabilities and/or scent aversions.

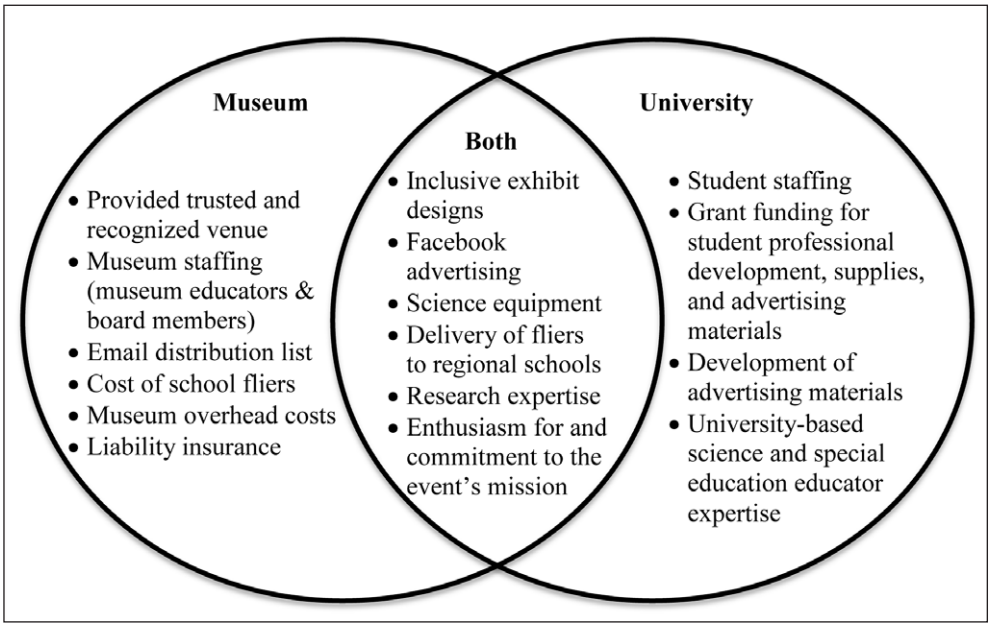

Figure 1: Collaborative Contributions.

development for the teacher candidates, and loaned the use of museum equipment. The university students were able to purchase necessary supplies for the inclusive exhibits, developed the advertising materials, and provided an abundance of volunteers to staff the event. Both entities helped to design inclusive exhibits and contributed to advertising channels. **Figure 1** further details the collaborative contributions of each partner.

Eighteen teacher education student volunteers, three university faculty members, two museum educators, and two museum board members staffed the event. Each inclusive science station that was designed by teacher education students was staffed by a minimum of two students. The event lasted two hours and was well attended, attracting approximately 150 people with ages of attendees ranging from infants to older adults. Attendance numbers were on the high side of what the museum typically experiences for special event days, especially for an event lasting only two hours. Caregivers' responses to the event are detailed in the research findings detailed next.

Methodology

To evaluate the success of the event and the impact of the community-university partnership, the researchers designed a survey to be administered to attendees' caregivers. Incorporating both descriptive and open-ended response opportunities created depth in participants' responses. As recommended by Patton (2015), the researchers were interested in investigating findings that pushed beyond traditional Likert-style questions to provide meaningful additional detail.

The research about this collaborative inclusive event was guided by the following questions:

- What factors help to facilitate a successful community-university partnership?
- Is the event accessible to the learners who attend?
- How does rurality impact accessibility and implementation of a collaboratively hosted inclusive science event?
- How do caregivers perceive the value of the collaboratively hosted inclusive science event?

Setting

The research was conducted during the event at the discovery museum, which is located in a rural, impoverished area of a Midwestern state. The nearest similar informal science learning center is more than 65 miles away. The museum is centrally located in a regional population hub that is home to a state university. At the time of the research, the discovery museum occupied about 3,000 square feet of space in a mall. Parking was easily available and access to the museum's exhibit space complied with the Americans with Disabilities Act (ADA, 1990). The museum regularly tries to be aware of and sensitive to the needs of all learners. However, the museum welcomed an opportunity to help plan and host an event specifically marketed as inclusive.

The university that partnered with the museum is a large state university that enrolls approximately 1600 undergraduate and 900 graduate education students. The university's Department of Teacher Education prepares teacher candidates to be licensed in Adolescent-to-Young Adult Science Education (grades 7–12), Middle Childhood Science Education (grades 4–9), Early Childhood Education (age 3-grade 3), and Special Education (preschool-grade 12). Each of these majors includes courses specific to teaching science. The university's National Science Teacher's Association is open to all students with an interest in science teaching and strives to provide multiple experiences for students to engage with children in science settings. The Student Council for Exceptional Children organization is a student-directed organization with a central mission to advocate for individuals with special needs.

Participants

Participants were 22 caregivers who identified themselves as parents, grandparents, big brother/big sister from the Big Brother Big Sisters organization, aunts/uncles, and foster parents who were attending the Inclusive Science Day event with a child or person with special needs. Approximately half of the caregivers who attended the event completed the survey. Due to the busy nature of the event and the varied needs of the learners who attended, not all caregivers could be asked to participate.

37 children attended with the 22 survey participants, with ages ranging from infants less than one year old to a 20-year-old adult with special needs. Participants attended with a range of one to four individuals, with nearly half attending with two children. The mean age of participants' attendees was six, with the majority falling between four and nine years of age. Forty-one percent (9) of participants attended with individuals with identified special needs, and 59% identified no special needs for the children attending with them. Of the 41% of participants who identified a special need, five categories of special needs were named (Developmental Delay (36%), Other Health Impaired (29%), Autism (21%), Specific Learning Disability (7%), Emotional Disturbance (7%). Two individuals utilized wheelchairs which included both an adult caregiver and one attendee with special needs.

Data Collection and Analysis

Data was collected during the Inclusive Science Day event and included a survey with 10 questions. Four of the survey's questions asked participants to provide descriptive data about their prior engagement with informal learning events and the individuals who attended the event with them. One question asked participants to identify if an individual attending with them had special needs. For this question, the categories corresponded to those identified in the Individuals with Disabilities Education Act (IDEA), the primary legislation that guarantees educational rights for students with disabilities (IDEA, 2004). The survey also included six open-ended, response questions that provided richer data about participants' perceptions of the collaborative event. These questions asked participants to describe their prior experiences with informal inclusive events, explain what was beneficial about the event for their child, and to recommend suggestions for future collaboratively hosted inclusive events. The open-ended questions also probed caregivers' perceptions of differences between the inclusive event and regular informal events and the impact of the rural setting.

To be mindful of trustworthiness in credibility (Patton, 2015), the survey was developed jointly by the lead researchers, who had content expertise related to informal learning, inclusive science, partnership development, and rural education. The survey took participants anywhere from 15 to 20 minutes to complete. Consistent with qualitative data analysis techniques, the open-ended questions were analyzed employing open coding that identified broad themes (e.g. collaborative practices, accessibility, enjoyment of the event, and benefits) (Creswell, 2004). From the broad themes, narrower codes emerged, including rurality, hands-on and interactive experiences, science content knowledge, and inclusiveness. In order to ensure a high degree of interrater reliability, the second author reviewed and compared codes for consistency. Analysis of the descriptive data contributed to the overall picture of event attendees and informed analysis of the longer response, open-ended data.

Limitations

As data was collected during the event, it was difficult at times for participants to engage in the survey while also supervising the learners who were with them. However, researchers believed conducting the survey during the event was the best way to increase the number of participants. It is likely that interviews would have provided greater depth in responses, although conducting formal interviews at an alternative time was also likely to result in fewer participants. It is also possible that if different or additional caregivers

participated in the survey, the breakdown of the types of special needs may have changed. Despite these considerations, a significant number of caregivers who attended the event readily agreed to complete the survey.

Findings

Accessibility and Rurality

Although the Inclusive Science Day event was marketed specifically to individuals with special needs, the findings reveal that the event was well attended by children with (41%) and without (59%) special needs. In rural settings, attendance at informal events is often very difficult to predict, and publicizing information about informal learning events to populations that are geographically far apart presents real challenges for museum educators (Hartman & Hines-Bergmeier, 2015). For this event, the discovery museum advertised the event through its social media network with both sponsored (paid) and unsponsored posts. The university student organizations also advertised the event on their Facebook pages, although their posts were not sponsored. Facebook was the most common way attendees heard about the Inclusive Science Day event, with 50% of participants citing it as their source. Significantly, as both the museum and the university utilized their Facebook networks to advertise the event, this potentially increased attendance. Participants also reported learning of the event through school backpack fliers (18%) and word of mouth (18%). Two participants (9%) learned of the event through advertising at other community events, and one participant (4.5%) was walking by the event and decided to attend.

Eighty-six percent of participants reported that they had never attended a similar collaboratively planned, inclusive education event in the region and cited lack of opportunities for inclusive events as the main reason for this. One participant explained, saying, "No, due to lack of experiences available in the area. Or, I didn't know it has been available." Nearly all participants appreciated that the event was local and easily accessible in the rural community, noting its location at a community-based venue. Two participants reported that the need for inclusive events was so great that they would have attended no matter where it was located in the community. Findings clearly demonstrate that accessibility within the region was key in attracting so many visitors to the event. All participants indicated that they would attend a similar education event in the future, although some requested that it be held in a larger space.

Perceived Value

Overwhelmingly caregivers with and without visitors with special needs positively reviewed the event. To describe why they found the event valuable, the most coded terms included 1) Hands-on, 2) Interactive, 3) Engaging, 4) Free-choice, and 5) Creative. One participant said, "It allowed them to be hands-on. It reiterated science concepts they have learned, plus a few new ones." In particular, caregivers cited the large number of volunteers (university students) who were available to assist visitors with the stations and appreciated that the volunteers were knowledgeable and skilled in communicating with children with special needs. To illustrate this, one caregiver wrote, "I like that there was tons to choose from. The volunteers were great with how they communicated with her." The number of available volunteers contributed significantly to caregivers' positive perceptions of the event. One-on-one interactions and the ability to provide additional instruction were also correlated to the positive feedback. With the additional staffing that the university students provided, children were more likely to get individualized interactions regarding science content. Caregivers also mentioned repeatedly that their children had fun, enjoyed themselves, and had the opportunity to interact with different children. One caregiver said, "They enjoyed themselves and interacted with kids from outside of their normal (school, church) groups," while another appreciated the opportunity to interact with more diverse groups.

Overwhelmingly, participants reported that they would bring their children to another inclusive event. Participants enjoyed that the event was indoors, with one explaining that they came because the event was "easily accessible, not weather dependent." Because rural areas often offer abundant outdoor learning opportunities, this is a significant perceived value for rural informal learning educators. About the likelihood of attending again, one caregiver said, "Very, we always look for chances to interact with neurotypical children." Participants did not miss the significance of the event being inclusive and spoke to the importance of such events for all kinds of learners. One participant said, "It sparked conversations before the event about what inclusiveness meant in terms of disabilities." Overall, the event was very well received and requests for similar events were noted.

Discussion

The findings indicated that caregivers seek out and enjoy events where they feel their children are well supported by qualified staff and/or volunteers. Many informal learning entities depend on volunteers to help engage visitors and to deliver content. In addition, volunteers have the potential to improve the museum experience for visitors (Holmes & Edwards, 2008). Caregivers cited the large number of volunteers (university students) as a key reason that the event was successful, drawing attention to the effectiveness of the university-museum partnership. During the Inclusive Science Day event, the number of adults who were available to assist children was approximately triple what the museum would typically have available to staff regular open hours. Since the university students were all teacher candidates with considerable experience working with children, the museum was able to provide programming with more individualized interactions and instruction.

Additionally, both partners' concerted efforts to create hands-on and interactive exhibits contributed to the success of the event. While information about the value of hands-on and interactive programming is not new to the research literature (Falk & Dierking, 2013; Garcia, 2015), the model of hands-on, interactive stations that are collaboratively planned and hosted presents a sustainable model for rural informal learning organizations on small budgets. Given this, the model of hands-on, interactive stations is a one that the discovery museum plans to continue implementing for future collaborative events. By partnering with the university student organizations, the museum shared responsibility for providing all of the supplies and materials necessary for hosting the event. As funding is a significant challenge for rurally-located informal learning entities in impoverished regions (Hartman & Hines-Bergmeier, 2015; Tlili, 2008), the supplying of both supplies and volunteers represents an important benefit of collaborative educational event planning to rural informal learning entities.

Ultimately, caregivers clearly appreciated having access to an event that was sensitive and thoughtfully planned for children with special needs. Findings also reveal that access to inclusive events in the rural region is lacking and that there is a strong desire for inclusive events. This supports previous research that cites lack of access to informal science opportunities as a barrier to science learning in rural areas (Dawson, 2014; Hartman et al., 2017; Showalter et al., 2017). Inclusive Science Day was developed to be sensitive to individuals with special needs, and children from a variety of backgrounds attended and enjoyed the event. The large number of visitors who attended the event highlights the need for inclusive events in the rural region and reveals that events that are marketed as inclusive may expect large attendance numbers. For rurally located informal learning organizations, making sure events are planned to be inclusive may provide another way to reach a region's most remotely located children and their caregivers. Two survey participants even related that they would have driven any distance to attend an inclusive science event in the region. Importantly, collaborating with professionals who are knowledgeable about special education may increase an event's credibility.

Informal learning settings offer unique opportunities for teacher candidates to engage with families in a real-world environment while also presenting science content (Dani et al., 2017; Duran et al., 2009; McGinnis et al., 2012). As many informal education researchers have advocated, collaborative partnerships between P-12 teachers and informal learning educators are essential (Bell et al., 2009; Bevan et al., 2010; Garcia, 2015). To maximize learning in both formal and informal settings, schools and museums need to work together. Consequently, museums must posit themselves as viable partners who will support teachers' learning objectives and provide meaningful learning experiences. Embracing university partnerships with teacher candidates provides an authentic model to increase the visibility and credibility of museums as worthy partners in P-12 learning opportunities for all. Finally, in order for true collaboration to occur, universities must work hard to overcome traditional power dynamics that impede collaborative efforts with communities (White, 2010). Inclusive Science Day created an opportunity for all partners to equally contribute content knowledge, without any partner being viewed as the sole expert.

Facilitating a Collaborative Inclusive Event in Rural Settings

Hosting an event that is highly focused on inclusive practices may require advance planning, additional staffing, and training in what inclusive practices look and feel like. To handle the additional one-on-one supports that inclusive events may require, informal learning organizations should consider embracing partnerships with universities and other community organizations. In rural areas, leveraging local expertise is particularly important, especially when a museum is in an impoverished area and funding is minimal (Parsons et al., 2017). This may help to offset costs associated with staffing and exhibit rotations. In particular, rural informal learning practitioners should seek partners that have content knowledge that

compliments the organization's mission and exhibit needs. For example, for Inclusive Science Day, it was beneficial to have special education experts involved in the planning of the science stations. Additionally, the teacher candidates who participated in the project made valuable recommendations for future collaborative events, such as ideas for additional funding sources for consumable materials and creating a "Quiet Zone" for visitors who wanted a break from the bustling environment. These suggestions highlight the value of the community-university partnership to enhance informal learning opportunities and accessibility.

As the instructional and organizational leader, informal learning educators should be prepared to offer varying levels of support to collaborative partners. Some collaborators will need more support in identifying inclusive practices, creating multidisciplinary, integrated stations (e.g. Science and Art were both part of *Galaxy in a Jar* and *Butterfly Chromatography*), and working with visitors during events. Informal learning educators should also plan to supplement collaborators' materials with their own materials and complimentary exhibits (see **Table 1** for museum-created stations from this event). Finally, rural museums who host inclusive events should use a variety of strategies to advertise them and should consider sponsoring (paying for) advertising on social media outlets such as Facebook, as well as advertising through school-based channels. Despite significant connectivity problems that persist in rural areas (Patterson, Watts, Rathbone, & Edwards, 2016), for this event, Facebook still represented the best mechanism for reaching the intended audience. Additionally, both partners should utilize their networks to advertise collaboratively planned events. This furthers the reach of the event and may improve accessibility, which is particularly relevant in rural settings.

Final Thoughts

The collaboration between the university teacher education student organizations and the discovery museum resulted in a highly attended and effective Inclusive Science Day event. The authors recommend that informal learning organizations in all areas consider planning and implementing an Inclusive Science Day event. However, given the lack of access to informal science learning events in rural areas, inclusive events in rural areas are particularly needed. The authors maintain that inclusive events are for all learners, both those with and without special learning considerations. Creating an environment of inclusivity is beneficial for all and should be the norm in places of informal learning. For rurally located museums, leveraging local expertise through collaborative partnerships is an essential practice that may increase rural accessibility and a rural museum's educational impact. For all partners, a collaborative model allows for organizational educational goals to be met, collaborative skills to develop, and for all partners to mutually benefit from the experience. For rural informal learning educators, this type of partnership reflects a model for rural practitioners that is both sustainable and educationally impactful.

Competing Interests

The authors have no competing interests to declare.

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