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Listening to Place: Secondary Analysis of Participatory Data through Community Asset Mapping with Rural Appalachian Families

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Poster: Listening to Place: Secondary Analysis of Participatory Data through Community Asset Mapping with Rural Appalachian Families

Introduction

This community assets mapping work builds on ongoing collaboration with a nonprofit arts and cultural center located in a restored historic post office in a rural Southeastern Appalachian County. The center functions as a communal focal point for creativity, education, and intergenerational engagement, making it an ideal site for participatory research. The purpose of this study is to enhance comprehension of community members' perceptions regarding their assets, needs, and sources of support, and to consider how these insights can inform future family- and community-based learning opportunities.

Data for this project were originally collected during a culminating community learning event (CLE) for a three-day summer data art camp, where participants responded to open-ended prompts designed to surface perspectives on gathering places, community needs, helpers, favorite spaces, and personal influences [1]. The original activity was designed as a participatory visualization exercise, in which youth and families co-constructed a collective yarn network by linking their names to responses posted on large-format posters throughout the event space.

Following the event, a secondary analysis of those responses was conducted. Upon encountering the Participatory Asset Mapping (PAM) framework [2], it became evident that the community responses could be systematically categorized into PAM asset domains, enabling a more structured examination of community strengths and priorities. This paper presents that secondary analysis, including a PAM-grounded network representation of community assets that extends beyond frequency reporting to reveal the relational structure of community knowledge. This approach is consistent with efforts that build collaborative research capacity by positioning community members as co-creators of knowledge [3, 4].

This work aims to illustrate how secondary analysis of participatory data can yield valuable insights into community-identified issues and place-based solutions to inform culturally responsive, asset-based approaches to STEM and computing education. The central scholarly contribution of this work is methodological: it demonstrates that participatory data collected through low-tech, accessible community engagement methods can be formalized into a network structure that yields structural insights beyond what frequency analysis alone provides. Specifically, the network representation surfaces multi-domain bridge assets that valued simultaneously across multiple dimensions of community life, whose programmatic significance would be invisible without the network lens.

Data Sources

The data analyzed in this work originated from a community learning event that focused on exploring local data and creating visual expressions. Participants (n=13) were invited to respond to five open-ended questions about their communities, including:

- Who has helped you become who you are?
- What is your favorite place in the community?
- Who are the helpers in your community?
- What does your community need more of?
- Where does your community gather?

These prompts were posted on five large-format posters throughout the event space. Participants linked their names to selected or self-generated responses using colored yarn and tape, thereby creating a collective visual network of associations that captured community relationships, values, and social structures from their perspectives. In addition to photographs of the yarn-based visualizations, written responses were compiled into a dataset that included both frequencies (counts of responses) and open-ended text. A photograph of one yarn visualization is presented in Figure 1.

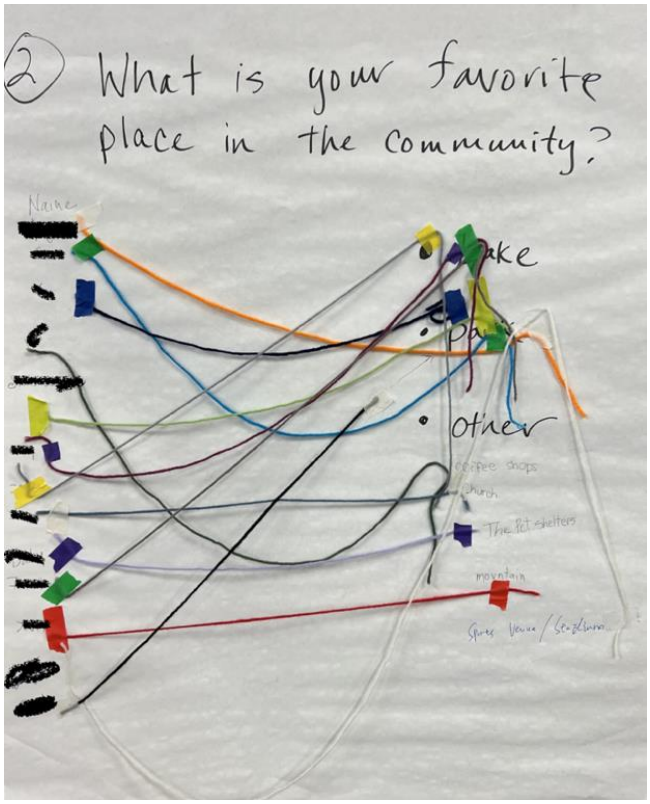

Figure 1: Collective yarn visualization co-constructed by participants during the CLE. Each colored thread represents an individual participant's association with a community response.

Secondary Data Analysis

A secondary analysis of the dataset was conducted by transcribing and organizing participant responses into categories that align with the Participatory Asset Mapping (PAM) framework [2]. The PAM framework identifies five community asset domains: People and Skills, Institutions and Spaces, Associations, Cultural Values, and Community Goals. This framework was identified after the original data collection; its application here represents a deliberate analytical choice to map existing participatory data onto an established community development framework, consistent with recognized secondary analysis methodology.

Quantitative frequencies were calculated to identify the most common responses within each domain, while qualitative analysis focused on recurring themes. Building on frequency analysis, a network representation of community assets was constructed in which PAM domain categories served as hub nodes and individual participant responses served as asset nodes sized proportionally to their response frequency. Hub-to-hub connections between all five PAM domains were drawn to make the relational structure of the framework explicit.

Assets appearing across multiple PAM domains, including Teachers, Park, and Church, were identified as multi-domain bridge assets and positioned between their respective domain hubs. This network construction allowed for an examination of structural properties, particularly asset centrality, that frequency counts alone cannot reveal. While the small sample size (n=13) precludes formal inferential network statistics, the descriptive network structure provides a formalization of community asset relationships that has direct implications for programming and further research.

This analytic process reflects participatory research principles emphasizing collaboration, reciprocity, and accessibility of findings for community partners [3, 4].

Findings

The secondary analysis reveals several interconnected themes related to community assets, needs, and values. Findings are presented first through the five participatory prompts organized by PAM domain, then synthesized through a cross-category radar visualization and a PAM-grounded community asset network map.

People and Skills: Influences on Personal Identity

The most dominant theme across all responses was the centrality of family (84.6%, n=11) in shaping personal identity. Additional influences included friends (46.2%, n=6) and teachers

(15.4%, n=2), with one participant noting the National Christian Forensics and Communications Association (NCFCA, 7.7%, n=1).

Interpretation: Families, alongside peers and teachers, form the foundation of youth development in this community, highlighting the deep intergenerational ties.

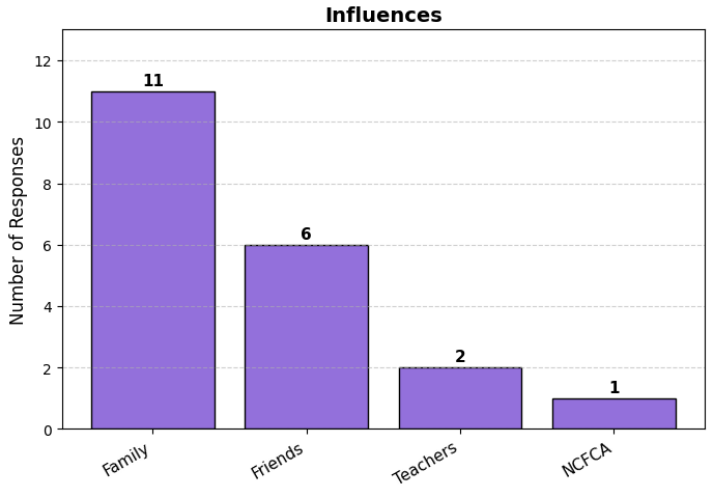

Figure 2: Influences on personal development identified by participants.

Associations: Favorite Places

Nearly half of participants (46.2%, n=6) named parks as their favorite places, followed by lakes (23.1%, n=3) and churches (15.4%, n=2). Other responses included coffee shops, pet shelters, mountains, and sports venues (7.7% each, n=1).

Interpretation: Outdoor and natural environments dominate, reflecting a place-based identity deeply rooted in Appalachian landscape. These responses map to the Associations domain, representing the informal spaces through which community bonds are sustained.

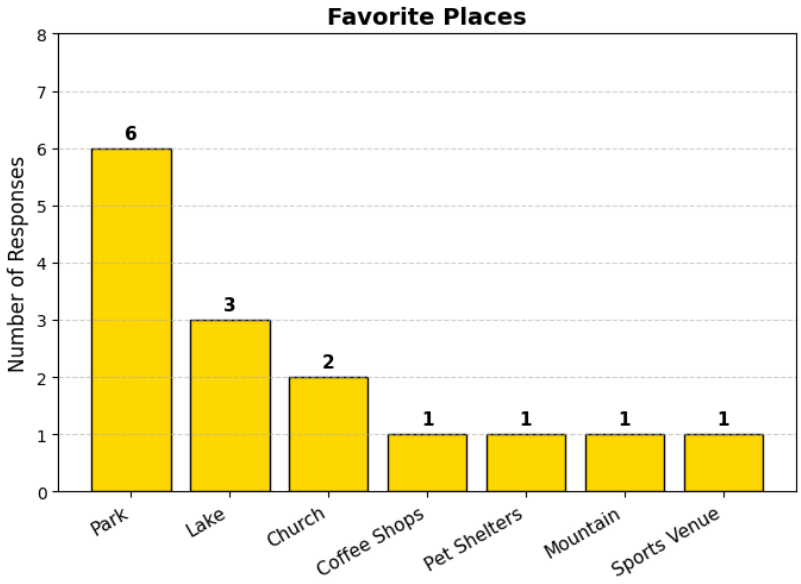

Figure 3: Favorite places in the community.

Institutions and Spaces: Community Helpers

Participants most often recognized teachers (63.6%, n=7) as key helpers, followed by nurses and doctors (27.3%, n=3), veterinarians (18.2%, n=2), and first responders (9.1%, n=1).

Interpretation: Teachers are perceived as the most trusted and valued helpers in the community, underscoring the pivotal role of education in rural community life. In addition, healthcare and emergency service providers are acknowledged as essential community institutional assets.

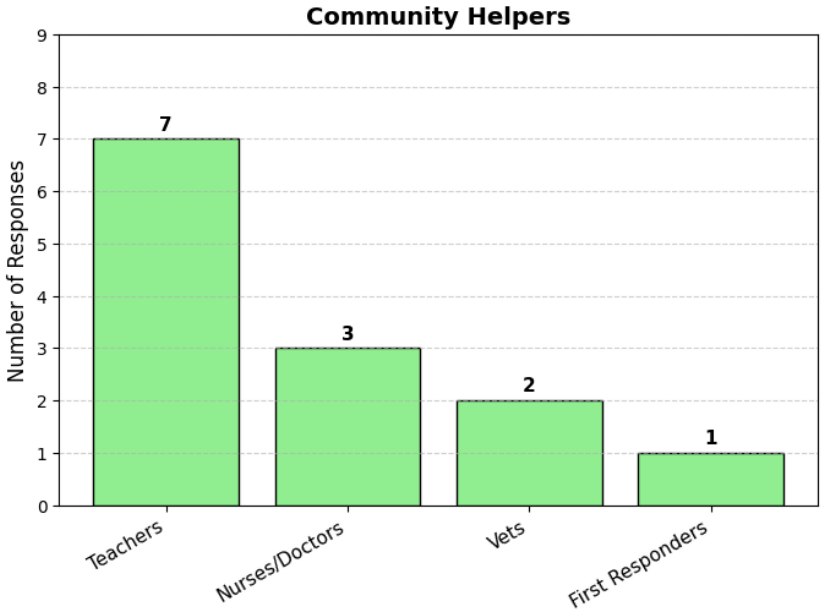

Figure 4: Community helpers identified by participants.

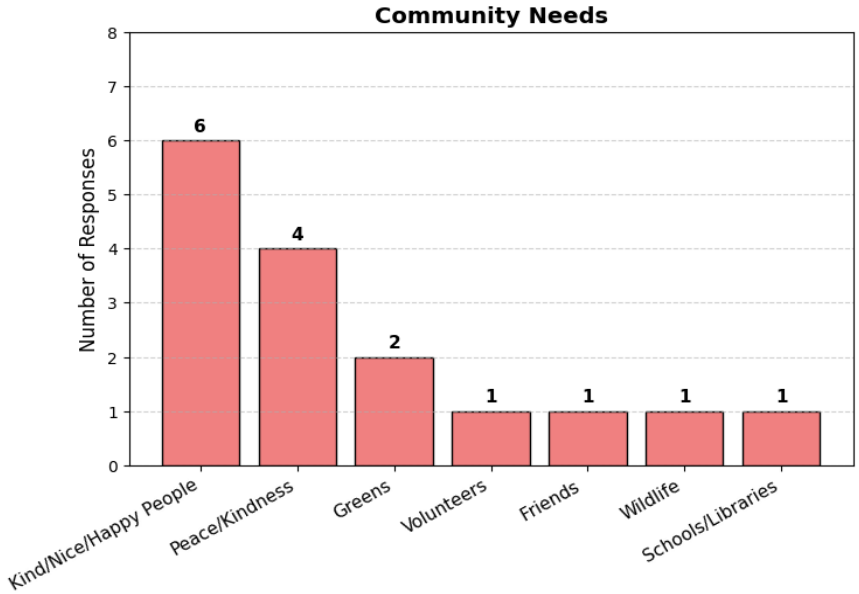

Figure 5: Community needs identified by participants.

Cultural Values: Community Needs

Half of participants (50%, n =6) identified the need for kind, nice, or happy people, while a third (33.3%, n=4) emphasized peace and kindness. A smaller portion highlighted tangible resources such as greens (16.7%, n=2), volunteers, friends, wildlife, and schools or libraries (8.3% each, n=1).

Interpretation: Responses centered overwhelmingly on social and relational values rather than material resources, suggesting that community well-being is understood in fundamentally relational terms.

Community Goals: Gathering Places

Participants most frequently identified neighborhood parks (46.2%, n=6) as primary gathering spaces, followed by the local co-op (23.1%, n=3), churches (15.4%, n=2), and barnyards (15.4%, n=2), and restaurants (7.7%, n=1).

Interpretation: Gathering spaces reflect a strong connection to nature and to institutions that bring people together informally (local co-op) or spiritually (church). These responses emphasize the importance of shared public and faith-based spaces and reflect where the community collectively invests its presence.

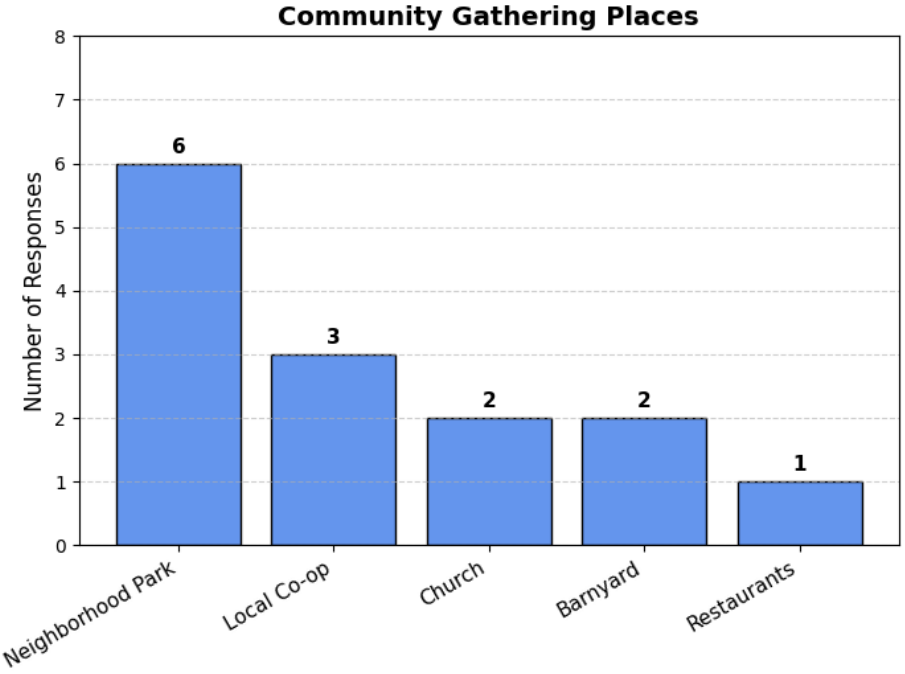

Figure 6: Community gathering places identified by participants.

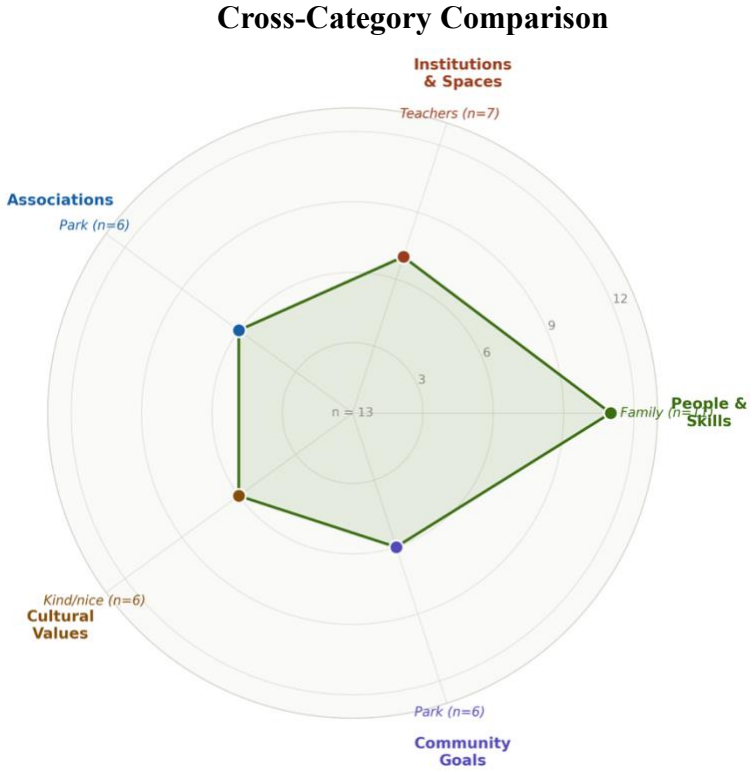

Figure 7: Radar chart comparing top response counts across all five PAM domains.

Figure 7 presents a radar visualization comparing the top response frequencies across all five PAM domains simultaneously. This cross-domain view reveals that parks and family anchor multiple domains at similar frequency levels, providing an early indication of their status as multi-domain community assets. The radar chart makes visible a pattern that individual frequency charts cannot show: the relative balance of asset strength across all five PAM domains at once.

PAM-Grounded Community Asset Network

Figure 8 presents the primary analytical output of this secondary analysis: a community asset network map organized by PAM framework domains. The five PAM domains serve as hub nodes; individual participant responses are asset nodes sized proportionally to response frequency. Hub-to-hub connections make the relational structure of the framework explicit, representing the interdependence of community asset domains.

Three assets emerged as multi-domain bridge nodes - assets that participants associated with more than one domain of community life. Teachers bridges People and Skills and Institutions and Spaces, appearing both as a personal influence and as a community helper. Park bridges Associations and Community Goals, appearing as both a favorite place and a primary

gathering space. Church bridges Associations and Cultural Values, functioning as both a cherished place and a spiritual gathering point.

Importantly, the network structure surfaces an insight invisible to frequency analysis alone: Teachers ranks third in raw response frequency (behind Family and Friends) yet occupies the most structurally central position in the network by virtue of bridging two domains. This divergence between frequency and structural centrality is a key finding of the secondary analysis. It suggests that Teachers functions as the single most important connective asset in this community, linking personal identity formation to institutional support, and should be prioritized accordingly in future programming decisions.

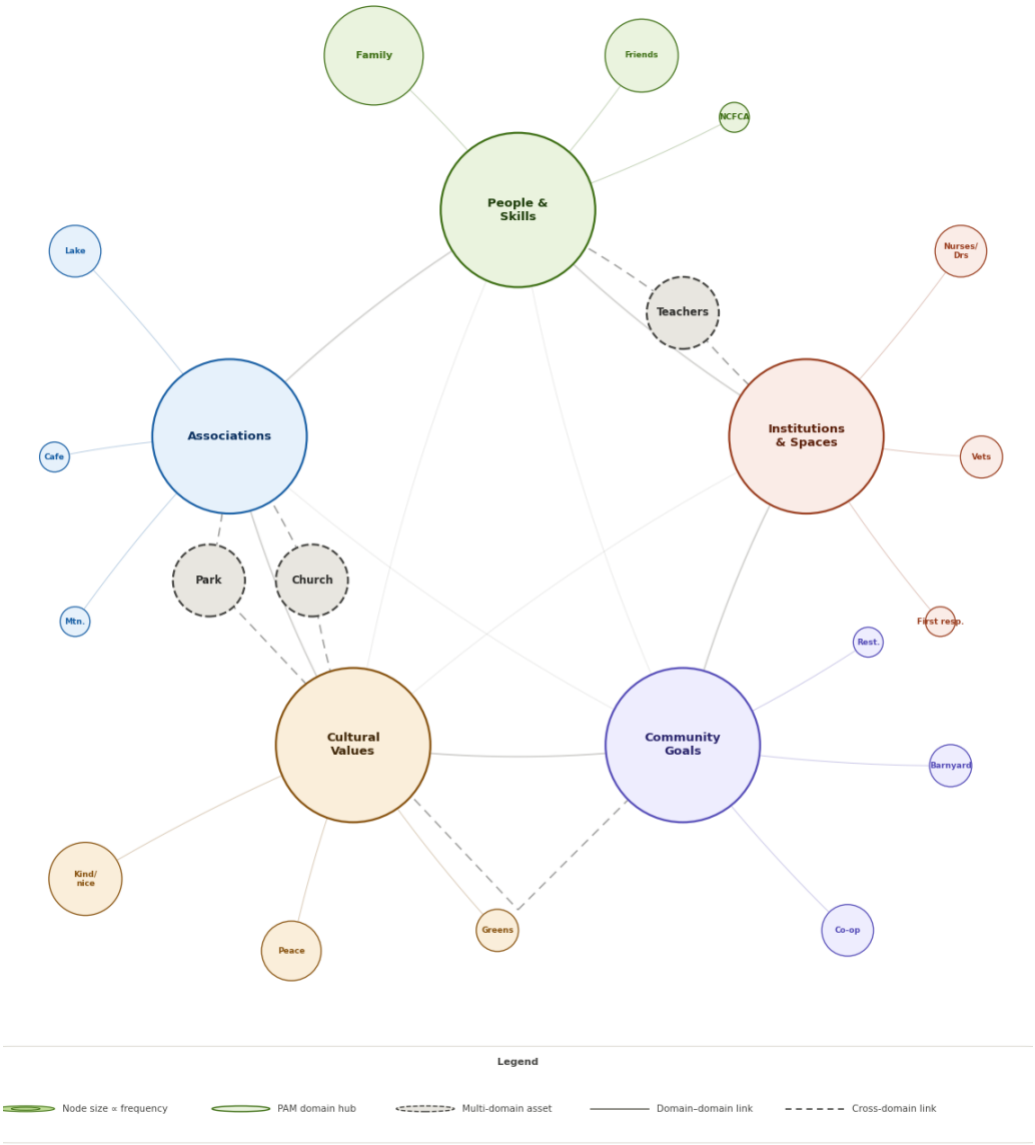

Figure 8: Community asset network map grounded in PAM framework domains (Burns, Paul & Paz, 2012).

Cross-Cutting Themes and Synthesis

Across the five participatory prompts, several themes consistently emerged as follows:

1. ***Family and Intergenerational Support***. Family is the most frequently cited influence on participants' sense of identity (84.6%) and anchors the People and Skills domain with the largest asset node in the network. Intergenerational relationships are the foundation from which all other community assets are understood.
2. ***Teachers and Educators as Community Pillars.*** Teachers are recognized as both personal influences and primary community helpers, making them the only asset to appear prominently across two separate PAM domains. The network analysis reveals that this dual role positions Teachers as the most structurally central asset in the community network - a finding with direct implications for partnership and programming.
3. ***Outdoor and Shared Spaces as Multi-Domain Assets.*** Parks appear as both the most common favorite place and the most common gathering place (46.2% in each domain), making them the highest-frequency multi-domain bridge asset in the network. Lakes and mountains also appear in the Associations domain, reflecting the deep connection to Appalachian landscape that characterizes this community's sense of place.
4. ***Social-Emotional Values as Community Priority.*** Responses in the Community Needs prompt center overwhelmingly on relational and social-emotional values, kindness, peace, and positive social interactions, rather than material or infrastructural resources. This pattern, anchored in the Cultural Values domain, suggests that community well-being is defined relationally in this context.

These themes collectively illustrate a community in which relationships, trusted institutions, and natural spaces play pivotal roles in shaping daily life. They also point to opportunities for building future programming that draws on these strengths, such as family-centered activities, school partnerships, and outdoor-based workshops, while also addressing the expressed need for stronger social harmony and kindness.

Insights and Discussion

The findings from this secondary analysis illustrate how participants define the assets, needs, and values of their community in ways that are both deeply relational and strongly tied to place. The application of the PAM framework to participatory visualization data produced several insights that extend beyond what the original event data alone communicated.

The most analytically significant finding is the divergence between frequency and network centrality for Teachers. Frequency analysis positions Family as the dominant community asset, which is an accurate and important finding. However, the network representation reveals that Teachers, not Family, is the primary connective tissue of the community asset structure, as teachers appear in both the People and Skills and the Institutions and Spaces domains that they bridge the personal and the institutional in ways no other asset does. For engineering education researchers interested in broadening participation and community-engaged STEM, this is a meaningful structural insight: teachers in rural and under-resourced communities are not merely educational resources but community connectors whose influence extends across multiple domains of life.

The identification of Parks as the highest-frequency multi-domain bridge asset also carries implications. Parks function simultaneously as cherished personal spaces and primary collective gathering points, a dual role that makes them natural venues for community-based programming. The Appalachian landscape is not background context but an active community asset, and programming that engages outdoor environments is likely to resonate with what this community already values.

The results also indicate the local arts center's potential to strengthen its role as a community hub. Future initiatives should deliberately engage families as co-learners, establish formal partnerships with local educators, and utilize parks and outdoor spaces as programming venues. Embedding social-emotional values, particularly kindness and relational well-being, into STEM and arts-based workshops would ensure new initiatives align with community-identified priorities.

Implications for Future Research and Programming

This study offers a replicable methodological approach for engineering education researchers: participatory community data, collected through accessible low-tech engagement methods, can be formalized through the PAM framework into a network structure that reveals community asset relationships with programmatic precision. Future work could extend this approach by increasing sample size across multiple rural communities, enabling comparative network analysis, or by applying weighted network measures that account for response frequency in edge strength.

From a programming standpoint, the community assets identified through this analysis suggest natural anchors for culturally responsive, place-based STEM initiatives. Teachers and

outdoor spaces, the two highest-centrality asset types in the network, represent entry points for future programming that connects computing and engineering concepts to what this community already knows and values. Intergenerational workshops hosted in community parks, co-designed with local educators, would directly honor the asset structure this community has articulated.

Acknowledgements

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References

[1] C. Chen, A. Maples, and L. L. Hodge, "*Data Art in Place: Youth-Designed Community Inquiry as a Model for Community-Engaged Learning*," Paper presented at the 2026 Annual Meeting of the American Educational Research Association. Los Angeles, CA, USA, 2026.

[2] J. C. Burns, D. P. Paul, and S. R. Paz, *Participatory Asset Mapping: Community Research Lab Toolbox*. Los Angeles, CA, USA: Advancement Project – Healthy City, 2012. [Online]. Available: https://hc-v6-static.s3.amazonaws.com/media/resources/tmp/Participatory_Asset_Mapping.pdf

[3] L. Atkins, "Researching 'with', not 'on': Engaging marginalised learners in the research process," *Research in Post-Compulsory Education*, vol. 18, no. 1–2, pp. 143–158, 2013.

[4] D. Martinovic, N. Wiebe, S. Ratkovic, C. Willard-Holt, T. Spencer, and M. Cantalini-Williams, "'Doing research was inspiring': Building a research community with teachers," *Educational Action Research*, vol. 20, no. 3, pp. 385–406, 2012.