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Focus Groups with Rural Youth Provide Interesting Insights

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Abstract: *Rural youth may have a distinct vantage point on STEM issues in their community, and if STEM interest is developed at a young age, the likelihood of solving these in adulthood may occur. Therefore, a place-conscious informal STEM program was developed to be delivered to youth ages eight to twelve in rural communities. Qualitative methods, including focus groups, were used to study interest development. These focus groups provided subtle details of how the interest developed. The results indicated an increase in participants' STEM interests.*

Keywords: Focus Groups, STEM Interest, Youth

BACKGROUND

For over 50 years, educational policies have funneled their money and attention toward strengthening education in science, technology, engineering, and math (STEM) disciplines. Following this period was a call from the President's Council of Advisors on Science and Technology (2010) to address the gap in interest levels and achievement for underrepresented groups in STEM disciplines. Therefore, this study developed an informal place-conscious STEM program to address the STEM interest gap to target underrepresented youth, particularly rural youth.

Rural communities have uniquely different STEM issues from urban or suburban communities. Therefore, a place-conscious STEM curriculum was developed to connect students with STEM learning. To develop a place-conscious curriculum, pilot interviews of local community members (Azano et al., 2020) were conducted to identify appropriate topics for their community. Place-conscious utilizes a deeper understanding of sociological contexts for a community beyond the place it is located (Greenwood, 2013). It was hypothesized that an informal place-conscious STEM program would increase STEM interest for the participants.

Qualitative methods were employed to investigate interest level development following three instructional methods of the informal place-conscious STEM program. One of these methods utilized was semi-structured focus groups. The data from these focus groups was central to understanding the nuances in interest development, particularly with younger participants. The focus group data provided insights into cognitive characteristics that could not be observed during the informal STEM program.

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STUDY PURPOSE

This study's methodology centered on semi-structured focus group interviews to understand the interest effects of an informal place-conscious STEM program on youth. Focus group interviews were chosen to allow the participants to voice their ideas about what was interesting or not interesting during the program. Additionally, the focus groups provided unique insights and supported interest observations that may have otherwise eluded the researcher. The affective factor of interest was selected to investigate the development of the four phases: triggering situational, maintained situational, emerging individual, and well-developed individual interest (Hidi & Renninger, 2006). This age group, eight to 12 years of age, is not well represented in interest development literature (Rotgans & Schmidt, 2017). This paper focuses on the following research question:

What do focus groups tell us about the effectiveness of an informal STEM place-conscious curriculum in increasing STEM interest for youth?

REVIEW OF LITERATURE

Interest is an influential factor in learning and education that has been explored for over 100 years. John Dewey was among the first to recognize interest as a driving factor for learners to engage with "self and world" as an interactive process (Glassman, 2001). A resurgence of interest research has been predominately geared toward interest generation with text (Hidi, 1990). Interest has been described as having affective and cognitive components that help increase student motivation to learn and increase understanding of the content (Silvia, 2008).

Focus Groups A methodological review of focus groups with children noted that a researcher could "capture perspectives, original ideas, and insights." At the same time, these discernments can be more limited in self-report methods (Kennedy et al., 2001, p. 184). Additionally, semi-structured interviews allow the researcher to carefully articulate interest development questions while leaving an opening to engage in follow-up questions as they evolve during an interview. As noted by Kamberelis & Dimitriadis on focus groups, “The pedagogic function basically involves collective engagement designed to promote dialogue and to achieve higher levels of understanding of issues critical to the development of a group’s interests…” (2013, p. 2). Therefore, it is theorized that the use of focus groups with children will provide details that are not necessarily cognitively recognized without dialogue between the group and the researcher.

Focus groups with children have proven advantageous in creating a safe environment, triggering responses from other participants' dialogue, facilitating sharing and discussion, and being successful with children as young as eight (Greene & Hogan, 2005). Furthermore, focus groups with children can promote involvement by encouraging peer involvement, reducing self-consciousness with a peer audience, and modeling acceptance of children's accounts with their peers (Kennedy et al., 2001). A study on children sharing information in groups noted that children in groups were better able to communicate and make decisions than individual conversations with researchers (Gummerum et al., 2014). When children were asked to share information individually, details were left out compared to when they shared as part of a group. Barron (2006) noted a lack of studies using interviews with children ages eight to 12, specifically in an informal STEM context. Walan and Gericke's (2019) study conducted focus group semi-structured interviews to stimulate discussion and provided additional details to their questionnaire results. These studies indicate the need and importance of focus groups to provide details of interest development in youth.

Research Methodology

Focus group interviews allowed youth participants to describe their experiences and answer questions. The participants had the opportunity to build off one another's comments and offer insights and details possibly missed in non-participant observations. Additionally, focus group responses were used to validate observation data.

The researcher conducted a focus group using semi-structured interviews (Dempsey & Tucker, 1994) with youth from each activity of the informal program to gather insight into their perception of STEM interest changes. Questions were created based on interest activity indicators and characteristic behaviors. Focus group interviews allowed youth to reflect on their ongoing interactions with each program's instructional methods and any resulting STEM interest changes. Semi-structured questions were used to help participants focus and remember particular program elements.

All focus group interviews were recorded and transcribed. The data were deductively coded with a priori provisional codes. Please see Table 1 for a list of the codes. Additionally, the initial codes from observational data were validated if the participant joined the focus group. Utilizing both sets of codes allowed the researcher to review transcripts of the initial cycle a priori coding of the focus group interview data alongside the observational data. These segments were sequentially coded for interest trigger activity and learner characteristic behaviors. Additional activity and characteristic codes were identified through the data analysis of these interview transcripts. These coded segments were then reviewed to determine in vivo quotes, allowing the researcher to review transcripts multiple times via the transcription process, a priori activity coding, and a priori characteristic coding. This coding round generated a list of in vivo quotes and participants' words to complement participant actions.

Data from the focus groups were organized using activity and characteristic codes and analyzed descriptively by frequency and percentage for each instructional method. Frequency was determined by identifying the number of instances for each interest variable. The percentage was calculated per each variable type, activity, or characteristic. The researcher examined the data for logical frequency patterns to determine the most common codes.

Focus Group Results

Focus group data was analyzed and is reported here for each instructional method of the informal STEM place-conscious program. The interest variables with the highest frequencies for the hands-on instructional method were challenge, group work, hands-on activity, and emotionality. Next, in the role model instructional method, the interest variables with the highest frequencies were novelty, activity level, and emotionality. Finally, in the culminating project instructional method, the following interest variables with the highest frequencies were personal relevance, autonomy, activity level, awareness, and emotionality. In a review of the focus group results, emotionality was a consistent indicator of interest development over each instructional method. Secondary indicators for interest development were activity level and awareness.

Table 1
Interest Codes (Westbrook, 2021)

Activity Code	Detail Description	Inclusion Criteria	Typical Exemplar
Autonomy	Focus on personal achievement, independence, and works alone	Participant is engaged in activity alone.	Participants took pieces to another table to construct a pump without the group.
Challenge	An attempt to grasp a concept or reality is sometimes viewed as contradictory to the participant's held belief	Relates to the STEM topic or activity, should include an activity code	Participants are frustrated with how to put materials together; participant verbalizes their frustration, "I quit!"
Computer/technology	Computer or technological equipment is utilized	Participant is using equipment or anticipation of equipment use.	Can I take pictures with my iPad and upload them to the website?
Group Work	Participants interactively work together on an activity or task	Must include more than one participant and activity/task related to the program topic	A Group of participants is building a water pump
Hands-on activity	The participant is actively participating in a tangible activity.	Activity is related to the STEM topic of the program	One participant handles a piece of PVC, and another places an O-ring onto it.
Instructional conversation	Adult or group participant listens to the participant and responds to clarify the intended meaning	The participant interacts with an Adult or another participant in the group during the program.	"You mean a creek when you are saying irrigation ditch?"
Novelty	The quality of the event is new as well as striking, original, or unusual	The participant learns something new, does something for the first time, or finds an event unusual	"I've never done something like this before."
Personal Relevance	Participant connects the activity topic to their interests, aspirations, and life experiences	Relates activity to a community context or personal context.	"I have a water pump like that at my house."

Characteristic Code	Detail Description	Inclusion Criteria	Typical Exemplar
Activity Level	How involved in cognitive engagement or physical involvement with an event	Should include activity that participant is involved in	The participant was highly engaged with the building of the pump. They were thinking out loud and verbalizing their movements.
Awareness	Participant's ability to draw from past experiences, i.e., perception or knowledge of something	The participant is referring to STEM topics and their knowledge of that topic	My dad always says we will have bad forest fires if there isn't enough snow.
Emotionality	Participants feeling result from a physical or physiological response that influence thought and behavior	Participants express this through a change in facial expression, body language, or tone of voice.	"I got the water to come out!" shouts while jumping up and down.
Independence	The participant wants to act on their thoughts or feelings and not be influenced by others	Participant's behavior is towards an activity or STEM topic	The participant does not want to work with the group.
Mood	An affective state, less specific and intense and less likely to be provoked by a stimulus	Participant involved in a program activity has a general affective state	The participant's mood was typically melancholy.
Openness	The participant is willing to try new things	The participant is involved in an activity on the topic	The participant wants to be involved and states "Building is not just for boys."
Reactivity	Participant changes their behavior and is aware they are being observed	The participant is observed to behave abnormally during observation and should be verified with another Adult.	Participant states, "Climate change is fake." When presented with scientific evidence.

Sociability	Participant seeks out companions, engages in interpersonal relations, participates socially	Participant is engaged in a STEM activity	Participant invites their friend to work with them on a project.

Nuanced details from the focus groups revealed information that could not have been gained from the other methodologies. In comparing focus group details by gender, the following differences were noted from the transcripts. The girl participants expressed how they did not like group work when their voice or participation was not heard or valued. This can be noted in their words; "No takeovers" (HG5) or "[there] is always the one person that puts himself in charge" (HG6). Additionally, I observed and noted a group's activities during the hands-on activity. My observation and notes did not align with WG4's comment about an event. I observed an adult reprimand her for taking over the group dynamics. WG4 remembered the boys in her group taking over the project, which upset her. She commented, "I learned that sometimes people just want to take over." I found this contradiction in observation and focus group interviews striking and wondered if I had missed an event during the observation. She may have felt the scolding belittled her involvement in the hands-on activity, and in turn, she felt undervalued by her group. The opinions expressed by the girls gave witness to their dissatisfaction with their input not being heard.

These details would not have been captured in observations or self-report surveys. This methodology allows researchers to gain a deeper, more intrinsic insight into the actions observed during the program and a deeper understanding of the participant's viewpoints on their interest development.

CONCLUSIONS

This project specifically investigated interest development in upper elementary-aged youth, ages 8-12. To our knowledge, this is the first interest research study investigating this age group using qualitative methods. This study's evidence suggests that youth can express their feelings of interest and describe encounters that made them feel interested. Youth were engaged and comfortable sharing their thoughts and ideas on what interested them.

The evidence indicates that the focus groups used in this study are an effective and dynamic method for collecting STEM interest data for upper elementary youth. Holding a focus group with five participants was found to be ideal in terms of participant interaction and revealed the majority of details for interest development. Given that this age group is underrepresented in previous research, further studies in this vein would be worthwhile.

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