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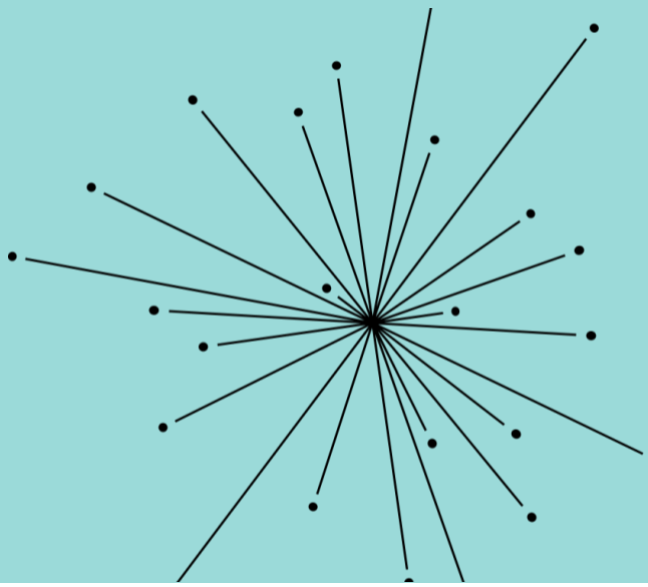

Learning Event #1 Report: December 9, 2021

Investigating Measurement of STEM Engagement and Advocacy in Older Adults

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Introduction

A team of interdisciplinary investigators from the University of California, Berkeley, received funding from NSF's Advancing Informal STEM Learning (AISL) program solicitation 17-573 to conduct exploratory research on informal STEM learning among older adults through an 18-month pilot study (#1906720). The researchers include faculty and staff from three campus units: the Osher Lifelong Learning Institute @UC Berkeley (OLLI); the Fung Fellowship for Wellness and Technology (the Fellowship), part of The Coleman Fung Institute for Engineering Leadership in the College of Engineering; and the Lawrence Hall of Science (Lawrence), the university's public science center. The purpose of the research is to develop and apply methods for measuring engagement in informal STEM learning (ISL) and STEM advocacy in older adults (50+ years of age); and (b) explore factors that lead to the engagement and advocacy of this population in ISL.

About Learning Event #1

The research study design included two informal learning experiences as opportunities to test some of the research instruments developed. The informal learning experience is a two-day learning event that incorporates the engineering design process to address a real-world problem and develop viable conceptual solutions. Members of OLLI, an informal learning organization of older adults, were recruited to take part in the informal learning experience and the accompanying research study.

Day one of the learning event was the Orientation and day two was the Design Challenge. A total of 24 OLLI members were recruited to participate, with 21 able to attend day one and 20 attending day two—joined by 12 undergraduate engineering students from the Fellowship for the Design Challenge. Seven intergenerational teams of 2-3 older adults and 1-2 undergraduates worked together to develop solutions to a real-world challenge. The undergraduates were not included as study participants

Research Study Overview

This study was designed to understand older adult participation and engagement in informal STEM learning environments and develop new methods for measuring participation, engagement, and advocacy in this population.

Research Objectives and Questions

1. To understand the characteristics of and reasons for participation by older adults in an informal STEM learning experience;
    a. What are the characteristics of the individuals who choose to participate?
    b. What encourages or facilitates participation?
2. To develop, pilot, and assess measures of ISL engagement and STEM advocacy outcomes on the part of older adults;
    a. Are we able to measure ISL engagement with a survey among older adults?
    b. Are we able to measure STEM advocacy with a survey among older adults?
3. To interpret and disseminate both the measures developed and tested in the course of this work and the preliminary findings from those measures to promulgate a deeper understanding of the ISL experience, particularly factors that support older adult informal STEM learning and the potential outcomes of those experiences;
    a. What factors of the learning experience moderate the engagement and advocacy?
    b. Do participants become more committed to advocacy over time?

Learning Event Study Overview

During the learning event we investigated research questions (RQ) 1 and 3. RQ 2 was investigated prior to the learning event and resulted in the development of the STEM advocacy and engagement survey instruments. These were used to investigate RQ3 during the learning event. A background survey was developed and used to investigate RQ 1.

Methods

Data Collection

The research study included the following data and measures:

Background Survey: Participants provided background information including age, gender, education level, prior STEM experience, and reasons for participation.

STEM Advocacy Survey: This 36-item instrument was developed as part of the research study. It includes four subscales that measure components of STEM Advocacy, including Value of STEM for Society, Knowledge of STEM Advocacy, STEM Advocacy Efficacy, and STEM Advocacy Identification.

STEM Engagement Survey: The ten-item STEM Engagement survey was adapted for older populations from a previously developed instrument designed for youth (ActivationLab.org). It measures behavioral, cognitive, and affective engagement as part of one unidimensional scale. It asks respondents to indicate their agreement with statements about their engagement during the activity.

Observation protocol: The learning engagement protocol was used by the research team to assess engagement of participants during the design challenge.

Participants completed the background survey at the beginning of the learning event. The engagement survey was administered twice, once at the end of day 1 and again at the end of day 2. The STEM advocacy survey was also administered twice—once at the beginning of day 1 and once at the end of day 2. The engagement and advocacy surveys are linked via a participant ID code generated by the participants, but the background survey data was not linked in this way to the other survey data as this was not necessary for analysis. Open-ended items were added to the STEM Advocacy and Engagement measures on day 2 to capture additional participant perspective on the impact of the learning experience.

Analysis

We prepared the survey data by matching the surveys based on ID code. We summarized the survey data using descriptive statistics and bivariate correlations using the statistical program SPSS. We coded open-ended responses to identify themes in responses. We compared observation data with Engagement survey data findings.

Findings

Participant Background

Participants shared demographic information including their gender identity, age, race/ethnicity, and highest education completed, in addition to their reasons for participation and prior experience with STEM. 76% of participants identified as female (n=16), while 24% identified as male (n=5). Most participants (76%) were 70 years of age or greater (Figure 1).

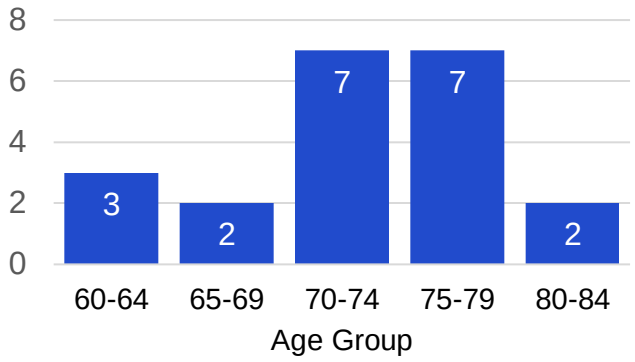

Figure 1. Participants by age group (*N*=21).

All participants identified as White, with one participant also identifying as Middle Eastern or North African. The highest level of education obtained by participants included some college (n=1), 2-year degree (n=1), 4-year degree (n=3), Master's degree or comparable professional degree (n=11), and PhD or comparable professional degree (n=5).

Most participants (76%) indicated that they participated in the learning experience because they wanted to learn (more) about the (human centered) design process, to support OLLI's research project (76%), and to participate in an in interactive hands-on experience (67%) (Table 1). Over half of respondents indicated that they wanted to participate in an intergenerational learning opportunity (57%).

In terms of STEM experience, most participants (62%) had work or other professional experience (Table 2). Some indicated that they had a STEM-related degree (38%), or educational experience but not a STEM-related degree (38%), while others had experience with STEM as recreation/hobby (29%) or as a volunteer/participant (24%).

Table 1. Reasons for Participation (*N*=21)

Reasons for participation	*Count (n)*	*Percent*
Learn (more) about the (human centered) design process	16	76%
Participate in an interactive hands-on experience	14	67%
Participate in an intergenerational learning opportunity	12	57%
Support OLLI's research project	16	76%

Note. Participants could select more than one response.

Table 2. Prior Experience with STEM (*N*=21)

Prior experience with STEM	*Count (n)*	*Percent*
Recreation/hobby	6	29%
Involvement with a STEM organization as a volunteer or participant	5	24%
Work or other professional experience	13	62%
Educational experience but not a STEM-related degree	8	38%
STEM-related degree	8	38%

Note. Participants could select more than one response.

STEM Engagement

Participants took the engagement survey immediately after participation in the learning activity for both days of the learning event. Participants were able to skip any questions they did not wish to answer, therefore the number of responses per item varied. Response options for each item included "Disagree strongly" (1), "Disagree" (2), "Agree" (3), and "Agree strongly" (4).

Table 3 shows the overall average responses for each item on the 1-4 scale, and Table 4 shows the number and percentage of respondents indicating "Agree strongly" or "Agree." Overall, respondents indicated greater engagement (indicated by higher agreement with the items, i.e., closer to 4) for the design challenge compared with the orientation. 80%-100% of respondents agreed or agreed strongly with items for the Design Challenge, compared with 37%-95% for the Orientation. The item with the least agreement for the Orientation was "It was easy to stay focused" (37%) and for the Design Challenge it was "I was fascinated" (80%).

The engagement scale scores for the Orientation and Design Challenge are shown in Table 3. There was not a statistically significant difference in the scale scores between the Orientation and Design Challenge (t=1.741, df=17, p=.1), indicating that although participants reported higher engagement on average at the Design Challenge compared with the Orientation, this difference was not statistically significant.

Observation

Observation data indicated that participants were highly engaged with activity tasks during the Design Challenge. Evidence of engagement demonstrated by participants included continuous focus during the

Table 3. Descriptive Statistics for Engagement Survey

	Orientation			*Design Challenge*		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
1. I thought the activity was exciting	19	3.11	0.81	20	3.50	0.61
2. I enjoyed the activity	19	3.37	0.68	20	3.65	0.49
3. It was easy to stay focused	19	2.58	1.07	19	3.32	0.67
4. I was curious to find out what might happen next	19	3.16	0.77	20	3.30	0.73
5. I was fascinated	19	2.79	0.63	20	3.05	0.69
6. I was intrigued	19	2.89	0.81	19	3.26	0.56
7. I felt mentally stimulated	19	3.26	0.81	19	3.68	0.48
8. I paid attention most of the time	19	3.68	0.58	20	3.75	0.44
9. I found myself wanting to learn more	19	3.37	0.83	20	3.40	0.68
Mean scale score	19	3.14	0.65	20	3.42	0.49

Note. Response options for each item included "Disagree strongly" (1), "Disagree" (2), "Agree" (3), and "Agree strongly" (4).

Table 4. Respondents Indicating "Agree strongly" or "Agree" on Engagement Survey

	Orientation		*Design Challenge*	
	Count (n)	*%*	*Count (n)*	*%*
1. I thought the activity was exciting	14	73.7%	19	95.0%
2. I enjoyed the activity	17	89.5%	20	100.0%
3. It was easy to stay focused	7	36.8%	17	89.5%
4. I was curious to find out what might happen next	15	78.9%	17	85.0%
5. I was fascinated	13	68.4%	16	80.0%
6. I was intrigued	12	63.2%	18	94.7%
7. I felt mentally stimulated	17	89.5%	19	100.0%
8. I paid attention most of the time	18	94.7%	20	100.0%
9. I found myself wanting to learn more	17	89.5%	18	90.0%

Note. Response options for each item included "Disagree strongly" (1), "Disagree" (2), "Agree" (3), and "Agree strongly" (4).

activity, sharing of relevant personal experiences, active listening, contributing ideas and writing them on post-its and posters, and seeking input and asking process-related questions of the undergraduates. In many cases, the Fung Fellows acted as facilitators of the learning activity by guiding activity procedures and the use of materials and checking for understanding. In each group, all group members contributed ideas and was demonstrated interest in activity tasks. These findings are in alignment with the survey responses, which showed high engagement particularly for the Design Challenge.

Open-Ended Items

Participants were asked to answer open-ended questions about their engagement:

1. What aspects of the Design Challenge were most engaging for you?
2. How did the intergenerational aspect impact your engagement, if at all?
3. How did the topic of the Design Challenge impact your engagement, if at all?
4. How did attending the Orientation impact your engagement, if at all?
5. Is there anything else you'd like to tell us?

Twenty participants responded to questions 1-3, and 11 responded to questions 4 and 5.

In response to question 1, participants felt the most engaging aspects of the Design Challenge included brainstorming (n=5), teamwork (n=5), design (n=2), problem-solving (n=6), and the Fung Fellows (n=1). The most common theme was the notion that working in groups and collaborating was beneficial for engagement. Example quotes include:

- “Solving a problem in group. Collaboration.”
- “The sharing of brainstormed ideas and deciding where to focus.”
- “Thinking together with a team. Learning the Design Process.”

In response to question 2, the majority of participants felt the intergenerational aspect positively impacted their engagement (n=17), and three respondents indicated little impact on their engagement. Respondents indicated that it was beneficial for the learning activity (n=5), helpful for the generation new ideas/knowledge (n=6), and helpful for developing new connections (n=6). Positive responses discussed how Fung Fellows gave participants new insights and ideas. Examples quotes include:

- “I enjoyed that aspect a lot. Very helpful – [Fung Fellow] was excellent, keeping us on track, had great ideas, knew what direction to go.”
- “Very accepting and positive to work with such engaged students.”
- “The Fung Fellows brought energy, expertise, and creativity.”

For question 3, how the topic of the Design Challenge impacted their engagement, respondents indicated that the topic was relevant to their lives (n=7) and interesting (n=7). Two respondents indicated that they would have preferred another topic, and several responses indicated uncertainty. Many respondents discussed how the topic was relevant or interesting to them and gave them new perspectives on design. Example quotes include:

- “Helped me understand complexities in design – how to break down problems to a very granular level.”
- “Today’s topic was much more engaging to me than yesterday’s. It felt more like something I could apply to my brain right now, without doing extensive research and consultation first.”
- “Our conversation was really great. We knew to keep on task. The topic led to many ideas because there so many different facets to explore.”

In response to question 4, whether attending the orientation impacted their engagement, 10 participants indicated that it was helpful in some way and one person was unsure. Most of the feedback was positive regarding the orientation, with participants indicating that it allowed them to feel prepared and succeed. Example quotes include:

- “Good summary and important points ‘Rules of Engagement’ was very helpful.”
- “It was extremely helpful. I learned a great deal and left prepared to take on the Design Challenge, learning the steps was necessary in order for us to succeed.”
- “The Orientation helped me focus on the process.”

Lastly, participants were asked if there was anything else they'd like to tell us. Seven respondents shared positive feedback, while four respondents shared negative feedback. Positive feedback related to their enjoyment of the experience, and negative feedback related to points of confusion or frustration. Example quotes include:

- "Loved working with the students, it gave me faith in the future."
- "Thank you so much. This was a wonderful experience. I learned a great deal. Much success."
- "I found it a little frustrating."
- "Did not understand why STEM Advocacy was surveyed."

Overall, findings from the open-ended items indicate that most participants found the collaborative aspects of the learning experience to be most engaging, felt the topic was relevant to their lives, thought the Orientation helped prepare them for the Design Challenge, and felt the intergenerational aspect was engaging. These findings align with the surveys and observations, which indicated a high level of engagement.

STEM Advocacy

Participants took the advocacy survey at the beginning of the orientation and at the end of the design challenge. Participants were able to skip any questions they did not wish to answer, therefore the number of responses per item varied. Response options for each item included "Disagree strongly" (1), "Disagree" (2), "Agree" (3), and "Agree strongly" (4).

The means for each of the advocacy scales including Value of STEM for Society, Knowledge of STEM Advocacy, STEM Advocacy Efficacy, and STEM Advocacy Identification are reported in Table 5, while the percentage of "Strongly agree" and "Agree" responses for each item is included in Table 6. The scale with the highest levels of agreement among respondents was Value of STEM for Society for both the Orientation and the Design Challenge. This resulted in a ceiling effect for that scale because the high levels of agreement maxed out the response scale, meaning there was very little room for positive change in measurement from the Orientation to the Design Challenge. The scale with the lowest levels of agreement was STEM Advocacy Identification.

The mean scale values were slightly, though not statistically significantly, lower for the Design Challenge compared with the Orientation for Value, Knowledge, and Efficacy. The mean scale value for Identification was higher, though not statistically significantly, for the Design Challenge compared with the Orientation. These findings indicate that there was no change in STEM advocacy between the Orientation and Design Challenge.

Table 5. Descriptive Statistics for Advocacy Survey Scales

	Orientation			*Design Challenge*		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
Value of STEM for Society	21	3.49	0.41	20	3.46	0.46
Knowledge of STEM Advocacy	21	2.95	0.47	20	2.84	0.60
STEM Advocacy Efficacy	21	3.12	0.38	20	3.10	0.47
STEM Advocacy Identification	20	2.48	0.51	19	2.57	0.40

Note. Response options for each item included "Disagree strongly" (1), "Disagree" (2), "Agree" (3), and "Agree strongly" (4).

Open-Ended Item

In an open-ended item, participants were asked if any aspects of the Design Challenge influenced their stance toward STEM advocacy. Twelve people responded to the item, with nine respondents indicating that it had positively impacted their stance toward STEM advocacy, one indicating that it had little impact, and one indicating no impact. The positive impact responses focused on the idea of teamwork, problem solving and interaction with others as positively impacting their stance toward STEM advocacy. Example excerpts include:

- "It made me more aware of how I could address significant issues in a thoughtful and collaborative manner."
- Working with the Fung Fellows. Learning about the breadth and depth of the design process. Seeing ways to bring the design process to other aspects of my life (family, dynamic, community)."
- "Looking at the need from a different lens; working on a solution to definite problem expanded my idea of what STEM was."
- "This depends on how STEM activities are recognized and for what – I don't have a clear idea of what "STEM Advocacy" applies after the 2 days."

Table 6. Respondents Indicating "Agree strongly" or "Agree" on Advocacy Survey

	Orientation			Design Challenge		
	N	*Count*	*%*	*N*	*Count*	*%*
Value of STEM for Society						
I only support political candidates who make science-based decisions	21	19	90.5%	20	19	95.0%
I believe that using STEM methods and approaches is the best solution to addressing societal problems	21	18	85.7%	20	18	90.0%
I believe it is important that the general public be aware of STEM issues (such as environmental justice, cybersecurity, or artificial intelligence)	21	20	95.2%	19	19	100.0%
I would pay more in taxes to increase funding for STEM initiatives	21	20	95.2%	19	17	89.5%
I strongly support organizations that advocate for STEM (see example organizations in definition)	21	20	95.2%	19	17	89.5%
I would vote to increase federal funding to support STEM workforce development	21	20	95.2%	20	18	90.0%
Knowledge of STEM Advocacy						
I am familiar with organizations that support STEM issues and topics (see example organizations in definition)	21	21	100.0%	20	19	95.0%
I know a STEM organization where I can get involved (at the local, national, or international level - see example organizations in definition)	21	19	90.5%	18	16	88.9%
I know how to help others get involved in STEM advocacy	21	9	42.9%	19	11	57.9%
I know how to contact public officials to express support for STEM issues	21	18	85.7%	20	14	70.0%
I know how to get involved in mentoring students in STEM	21	8	38.1%	20	6	30.0%
I know how to support STEM education initiatives (see examples in definition)	21	10	47.6%	20	12	60.0%
STEM Advocacy Efficacy						
I feel confident that I can find accurate information on a STEM topic	21	17	81.0%	19	18	94.7%
Contributing my time, energy, and/or financial support to STEM advocacy positively impacts society	21	21	100.0%	19	18	94.7%
When I work with others on STEM advocacy, we can contribute to solutions to STEM issues	21	21	100.0%	19	17	89.5%
My participation in STEM advocacy activities can make a significant difference in society	20	17	85.0%	18	16	88.9%
I can see myself participating in STEM advocacy	19	16	84.2%	18	13	72.2%
Engaging in STEM advocacy is an effective way to contribute to STEM issues that are important to society	19	19	100.0%	18	17	94.4%
I have skills that could benefit a STEM organization	19	16	84.2%	19	16	84.2%
I feel capable of helping others, who are interested, to understand STEM issues	20	14	70.0%	19	14	73.7%
I feel comfortable discussing STEM issues with other people	20	15	75.0%	19	15	78.9%
STEM Advocacy Identification						
I identify as a STEM advocate	19	14	73.7%	19	15	78.9%
I prioritize STEM advocacy in my life	20	6	30.0%	18	9	50.0%
People who know me well would identify me as an advocate for STEM issues	20	12	60.0%	18	9	50.0%
I consider ways I could get involved when there is a need for STEM advocacy	20	10	50.0%	18	11	61.1%
I have a role to play in the STEM community	20	12	60.0%	17	14	82.4%
Others encourage me to do STEM advocacy work	20	5	25.0%	16	5	31.3%
I actively pursue opportunities to get involved in STEM advocacy	20	4	20.0%	18	3	16.7%
I am known as a STEM advocate within my community	19	3	15.8%	17	4	23.5%

Relationships Between Engagement and Advocacy Measures

The strength of relationships between each of the variables was measured using Pearson Product-Moment Correlation. This measures the strength of relationships and produces the Pearson's correlation coefficient. A value between .5 and 1 indicates a high degree of correlation or a strong relationship, values between .2 and .49 indicating a moderate relationship, and values less than .29 indicating a low degree of correlation. Tables 7 and 8 show the correlations between variables for both the Orientation and Design Challenge.

Engagement was moderately correlated with each of the STEM advocacy variables except Identification, which was strongly and significantly correlated. This indicates a potential relationship between STEM Engagement and STEM Advocacy and with Identification in particular, whereby the more engaged one is in a STEM activity the more likely one is to identify with STEM. Among the STEM Advocacy variables, Knowledge and Efficacy were the most correlated for the Orientation, and Efficacy and Identity were most correlated for the Design Challenge. The least correlated variables for the Orientation were Value and Identification, however these variables were strongly and significantly correlated for the Design Challenge. For the Design Challenge, the Value and Knowledge variables were only moderately correlated. These differences in correlations between the Orientation and Design challenges likely reflect the positive shift in Identification and Engagement from the Orientation to the Design Challenge.

Table 7. Correlations between variables (Orientation)

	1.	2.	3.	4.	5.
1. Engagement		.34	.33	.25	.53*
2. Value of STEM for Society			.56**	.57**	.22
3. Knowledge of STEM Advocacy				.81**	.72**
4. STEM Advocacy Efficacy					.75**
5. STEM Advocacy Identification					

Note. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Table 8. Correlations between variables (Design Challenge)

	1.	2.	3.	4.	5.
1. Engagement		.47*	.39	.47*	.58**
2. Value of STEM for Society			.43	.70**	0.64**
3. Knowledge of STEM Advocacy				.75**	.57**
4. STEM Advocacy Efficacy					.79**
5. STEM Advocacy Identification					

Note. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

Key Takeaways

- Most participants were between the ages of 70 and 80 (67%), White (100%), and female (76%).
- Most participants (62%) had work or professional experience with STEM.
- The most common reasons for participation included supporting OLLI's research project (76%) and learning more about the human-centered design process (76%).
- Respondents were highly engaged during both the Orientation and the Design Challenge.
- There was no detected change in engagement between the Orientation and Design Challenge.
- Participants felt that the collaboration, the relevant topic, the preparation during the Orientation, and the intergenerational aspect contributed to their engagement during the Design Challenge.
- There was no detected change in STEM Advocacy between the Orientation and the Design Challenge.
- Nine respondents indicated that the learning event positively impacted their stance toward STEM advocacy, one indicated that it had little impact, and one indicated no impact.
- Engagement was moderately correlated with each of the STEM advocacy variables except Identification, which was strongly and significantly correlated.
- Among the STEM Advocacy variables, Knowledge and Efficacy were the most correlated for the Orientation, and Efficacy and Identity were most correlated for the Design Challenge.

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Engagement Survey

Instructions: For each item, fill in the corresponding bubble that best matches what you think and feel about the activity you just completed.

During this activity…	Agree strongly	Agree	Disagree	Disagree strongly
I thought the activity was exciting	○	○	○	○
I enjoyed the activity	○	○	○	○
It was easy to stay focused	○	○	○	○
I was curious to find out what might happen next	○	○	○	○
I was fascinated	○	○	○	○
I was intrigued	○	○	○	○
I felt mentally stimulated	○	○	○	○
I paid attention most of the time	○	○	○	○
I found myself wanting to learn more	○	○	○	○

Thank you for taking this survey

STEM Advocacy Survey

Instructions: Please read and refer to the following definitions for STEM, STEM Advocacy, STEM Issues, and STEM organizations.

STEM is an acronym that refers to the multiple fields and disciplines associated with Science, Technology, Engineering and Math. ***STEM*** is used in various contexts—not just in education—including careers/occupations, public policy, research and funding.

- Science includes the biological and physical sciences, plus medical/health and public health science;
- Technology includes computer science, robotics, artificial intelligence;
- Engineering includes civil engineering, bioengineering, electrical engineering;
- Mathematics includes statistics, mathematical analysis, as well as foundational mathematics.

STEM Advocacy activities are the personal or collective group actions that support, promote, or affect change related to STEM issues, policies, or causes.

STEM Organizations can include:

- Advocacy/policy organizations, such as The Union of Concerned Scientists, The American Association for the Advancement of Science;
- Funding bodies, such as The National Science Foundation;
- Professional organizations, such as National Society of Black Engineers, American Geophysical Union;
- Cause-driven organizations, such as Partners in Health, Natural Resources Defense Council, The American Cancer Society, The Sierra Club, The Audubon Society;
- STEM education initiatives, such as Girls Who Code, 4-H, or the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science.

STEM Issues can include different STEM-related topics that are important to society. Examples of STEM Issues include: Conservation and biodiversity, space travel and exploring the galaxy (e.g., Mars), gene editing, self-driving cars, or preventing the spread of disease.

Instructions: Please indicate the extent to which you agree or disagree with the following statements. You are welcome to skip any question you cannot or do not wish to answer.

Question 1.	**Agree strongly**	**Agree**	**Disagree**	**Disagree strongly**
a. I only support political candidates who make science-based decisions	○	○	○	○
b. I believe that using STEM methods and approaches is the best solution to addressing societal problems	○	○	○	○
c. I believe it is important that the general public be aware of STEM issues (such as environmental justice, cybersecurity, or artificial intelligence)	○	○	○	○
d. I would pay more in taxes to increase funding for STEM initiatives	○	○	○	○
e. I strongly support organizations that advocate for STEM (see example organizations in definition)	○	○	○	○
f. I would vote to increase federal funding to support STEM workforce development	○	○	○	○

Question 2.	Agree strongly	Agree	Disagree	Disagree strongly
a. I am familiar with organizations that support STEM issues and topics (see example organizations in definition)	○	○	○	○
b. I know a STEM organization where I can get involved (at the local, national, or international level - see example organizations in definition)	○	○	○	○
c. I know how to help others get involved in STEM advocacy	○	○	○	○
d. I know how to contact public officials to express support for STEM issues	○	○	○	○
e. I know how to get involved in mentoring students in STEM	○	○	○	○
f. I know how to support STEM education initiatives (see examples in definition)	○	○	○	○

Question 3.	Agree strongly	Agree	Disagree	Disagree strongly
a. I feel confident that I can find accurate information on a STEM topic	○	○	○	○
b. Contributing my time, energy, and/or financial support to STEM advocacy positively impacts society	○	○	○	○
c. When I work with others on STEM advocacy, we can contribute to solutions to STEM issues	○	○	○	○
d. My participation in STEM advocacy activities can make a significant difference in society	○	○	○	○
e. I can see myself participating in STEM advocacy	○	○	○	○
f. Engaging in STEM advocacy is an effective way to contribute to STEM issues that are important to society	○	○	○	○
g. I have skills that could benefit a STEM organization	○	○	○	○
h. I feel capable of helping others, who are interested, to understand STEM issues	○	○	○	○
i. I feel comfortable discussing STEM issues with other people	○	○	○	○

Question 4.	Agree strongly	Agree	Disagree	Disagree strongly
a. I identify as a STEM advocate	○	○	○	○
b. I prioritize STEM advocacy in my life	○	○	○	○
c. People who know me well would identify me as an advocate for STEM issues	○	○	○	○
d. I consider ways I could get involved when there is a need for STEM advocacy	○	○	○	○
e. I have a role to play in the STEM community	○	○	○	○
f. Others encourage me to do STEM advocacy work	○	○	○	○
g. I actively pursue opportunities to get involved in STEM advocacy	○	○	○	○
h. I am known as a STEM advocate within my community	○	○	○	○

Thank you for taking this survey