Knology

STEM Student Reporting Labs: Instruments & Data Appendix

STEM Engagement through Journalism

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Overview

In 2015, the National Science Foundation provided funding to WETA/PBS NewsHour to support an experiment that adapted their Student Reporting Labs (SRL) curriculum to feature a focus on STEM content. Independent evaluation of that four-year initiative was undertaken by Knology (formerly New Knowledge Organization Ltd.) to assess whether the adaptation supported increased media literacy, critical thinking skills, and whether the program helped students connect concepts learned in class to the world outside.

This appendix presents the instruments and topline data related to that work.

Appendix A includes a summary of story prompts provided to students.

Appendix B summarizes all research participants across various activities and years.

Appendix C reports on school characteristics in program Years 3 and 4.

Appendix D provides the student survey instrument.

Appendix E reports on reliability of all scales within the student survey instrument.

Appendix F reports on demographics of student survey participants in Years 2-4.

Appendix G provides the teacher survey instrument.

Appendix H provides the STEM and media mentor survey instruments.

Appendix I provides case study instruments used in Years 1-3.

Appendix J provides case study instruments used in Year 4.

Appendix K provides the film festival ballot.

Appendix L includes some additional detail about teachers' use of specific SRL resources.

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Appendix A

Story Prompts

Table 1. SRL signature series prompts for all four project years and classes submitting stories for each.

Project Year	Academic Year	STEM Prompt	# of classes submitting
1	2015-2016	Climate Change	8
2	2016-2017	STEM in the National Parks	15(+1)
3	2017-2018	STEM Problem Solvers	20
		Engineering: Our People, Our Planet	20
4	2018-2019	How Do We Achieve Our Goals?	19
		Citizen Science: What's Going on in Your Backyard?	16(+1)

Notes. This table includes main Signature Series assignments for each year.
Rapid Responses are not included in this table.
(+1) indicates a non-STEM story was submitted for this prompt.

Appendix B

Research Participants

Table 2 Methods used and *N* for each method across all project years

	2015 - 16 (Year 1)	2016 - 17 (Year 2)	2017 - 18 (Year 3)	2018-19 (Year 4)
# Total Sites	34	40	45	55
Experimental	17	20	21	29
Control	17	20	24	26
# Sites Responding to Survey	21	33	35	27
# Total Response				
# Matched* Student Surveys	249	326	402	169
# Control Teacher Surveys	8	10	9	10
# STEM Teacher Surveys	13	12	9	17
# Media Mentor Surveys	4	12	13	8
# STEM Mentor Surveys	3	5	5	7
# Site Visits / Case Studies				
Experimental Schools Only	6	6	6	6

Notes. * For purposes of this analysis, we excluded student surveys that responded only to pre- or post-program surveys and could not be matched.

§ Unlike other sources of data, mentor surveys and interviews were primarily formative, serving to provide feedback on logistical and administrative issues with the mentorship component of the program. As such, they are not a primary source of data for this paper.

Appendix C

School Characteristics by Project Year

Table 3. Participating schools by school type and geographic area.

Project Year	Academic Year	Class Type	Lab type			Geography		
			Public	Private	Other*	Urban	Rural	Suburban
3	2017-18	STEM	20	2	5	12	5	8
		Control	23	0	2	12	2	10
4	2018-19	STEM	25	2	3	17	3	9
		Control	17	0	1	9	2	7

Notes. * Other includes charter schools and afterschool programs. All data was collected from teacher agreements in Years 3 and 4.

Table 4. Participating schools' student demographics.

Project Year	Academic Year	Class Type	Free or reduced lunch				ELL			
			0-25%	26-50%	51-75%	76% +	0-25%	26-50%	51-75%	76% +
3	2017-18	STEM	1	8	7	6	14	5	1	1
		Control	1	5	7	11	16	5	2	1
4	2018-19	STEM	13	10	1	3	5	9	3	11
		Control	12	3	1	1	3	4	2	9

Note. All data was collected from teacher agreements in Years 3 and 4.

Appendix D

Student Survey Instrument (excl. assent/consent)

Module 3: STEM Literacy

Please rate your agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
Scientific knowledge is subject to review and change.	❍	❍	❍	❍	❍
Science progresses by refining and replacing old theories with new ones.	❍	❍	❍	❍	❍
Scientific knowledge stays the same over time.*	❍	❍	❍	❍	❍
Today's science laws, theories, and concepts may have to be changed in the face of new evidence.	❍	❍	❍	❍	❍
There are still many unresolved issues to be solved in science.	❍	❍	❍	❍	❍
Scientific knowledge is always correct.*	❍	❍	❍	❍	❍
Science is a search for truth.	❍	❍	❍	❍	❍
Scientific knowledge is the same throughout the world.*	❍	❍	❍	❍	❍
Scientific laws, theories, and concepts are continually being tested.	❍	❍	❍	❍	❍
The evidence to support scientific knowledge needs to be examined by other scientists.	❍	❍	❍	❍	❍
Scientists always agree about scientific knowledge.*	❍	❍	❍	❍	❍
Research results are more convincing if they can be replicated.	❍	❍	❍	❍	❍
Research results can be influenced by the methods used in a study.	❍	❍	❍	❍	❍
It is important to question the reliability of research.	❍	❍	❍	❍	❍

Note. * indicates a reverse-coded question. Items were presented on three separate pages for simplicity in viewing on a screen, in randomized order.

Module 4: STEM Interest

Please choose the circle between each adjective pair to indicate how you feel about the following topics.

	Boring						Interesting
To me, science is:	❍	❍	❍	❍	❍	❍	❍
To me, technology is:	❍	❍	❍	❍	❍	❍	❍
To me, engineering is:	❍	❍	❍	❍	❍	❍	❍
To me, math is:	❍	❍	❍	❍	❍	❍	❍
To me, health science and medicine are:	❍	❍	❍	❍	❍	❍	❍

Module 5: STEM Self Efficacy

The term STEM stands for Science, Technology, Engineering, and Math and includes all these subjects as well as health science and medicine, statistics, and computer science.

Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I am sure that I can understand STEM topics, even if they are difficult.	❍	❍	❍	❍	❍
I can explain some aspects of STEM topics to my friends.	❍	❍	❍	❍	❍
When a STEM topic is difficult, I try to find a shortcut to avoid learning it.*	❍	❍	❍	❍	❍
I can find trustworthy information about STEM topics.	❍	❍	❍	❍	❍
I know what to look for to determine if a study and its findings are valid.	❍	❍	❍	❍	❍
When speaking with a scientist, I can ask questions that will help me learn about their expertise.	❍	❍	❍	❍	❍
I think of myself as a ***math person***.	❍	❍	❍	❍	❍
I think of myself as a ***science person***.	❍	❍	❍	❍	❍
I am comfortable consulting STEM-related research articles to find information about a topic.	❍	❍	❍	❍	❍
When reading about STEM news, I usually understand the main ideas.	❍	❍	❍	❍	❍

Note. * indicates a reverse coded item. Items were presented on two separate pages for simplicity in viewing on a screen, in randomized order.

Module 6: Value of STEM Learning

The term STEM stands for Science, Technology, Engineering, and Math and includes all these subjects as well as health science and medicine, statistics, and computer science.

Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
STEM topics are applicable to my daily life.	❍	❍	❍	❍	❍
It is important for everyone to know how to find credible information about STEM topics.	❍	❍	❍	❍	❍
It is important for everyone to stay up to date on news about STEM topics.	❍	❍	❍	❍	❍
I find STEM topics relevant to my community.	❍	❍	❍	❍	❍
I find that news stories are often related to STEM topics.	❍	❍	❍	❍	❍
I find that political events are often related to STEM topics.	❍	❍	❍	❍	❍
I find that cultural events are often related to STEM topics.	❍	❍	❍	❍	❍

Note. Items were presented on two separate pages for simplicity in viewing on a screen, in randomized order.

Module 7: STEM Career Interest

The term STEM stands for Science, Technology, Engineering, and Math and includes all these subjects as well as health science and medicine, statistics, and computer science.

Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I could see myself studying something related to STEM in college.	❍	❍	❍	❍	❍
I could see myself having a job where I work in a STEM field.	❍	❍	❍	❍	❍
I could see myself having a job where I report on news stories.	❍	❍	❍	❍	❍
I could see myself having a job where I report on STEM news stories.	❍	❍	❍	❍	❍

Module 8: Feedback on SRL [Post-Test Only]

Just a few more questions!

What part of the SRL story creation process do you like the most?

And what part of the SRL story creation process do you like the least?

Do you have any suggestions for improving the SRL program?

Which prompt(s) did you work on? Select all that apply

- ❑ [Prompt titles were added each year]
- ❑ Something else (please specify) [not exclusive]

Which story format did you work on? Select all that apply.

- ❍ Broadcast story
- ❍ Social media story (please specify):
- ❍ Other (please specify):

❑

Module 9: Background [Pre-Test Only]

Were you part of Student Reporting Labs in the [previous] school year? [Display only if student's school participated in SRL in prior school year]

- ❍ No
- ❍ Yes
- ❍ I don't know

How did SRL affect the way you view your role as a storyteller? [Display ONLY if answer to question about prior participation was "yes"].

Did you work on the SRL STEM/Health story last year? [Display ONLY if answer to question about prior participation was "yes" **and** their school was a STEM or Health school in prior year]

- ❍ No
- ❍ Yes
- ❍ I don't know

How did working on the STEM or Health story affect the way you think about STEM issues? [Display ONLY if answer to question about STEM/Health story was "yes"]

What grade are you in? [Require response]

- ❑ 5th
- ❑ 6th
- ❑ 7th
- ❑ 8th
- ❑ 9th
- ❑ 10th
- ❑ 11th
- ❑ 12th

With which of the following do you identify? (Select all that apply.) [Request response]

- ❑ White / Caucasian
- ❑ Middle Eastern
- ❑ Black / African American
- ❑ Hispanic / Latinx
- ❑ Asian
- ❑ Native American
- ❑ Pacific Islander
- ❑ Prefer to self-describe (please specify)
- ❑ Choose not to respond

What is your gender? [Request response]

- ❍ Boy
- ❍ Girl
- ❍ Non-binary
- ❍ Prefer to self-describe (please specify)
- ❍ Choose not to respond

What is the highest level of education your mother completed? [Request response]

- ❍ Did not complete high school
- ❍ High school diploma
- ❍ Some college
- ❍ Associate's degree (2-year college program)
- ❍ Bachelor's degree (4-year college program)
- ❍ Some graduate school
- ❍ Master's degree
- ❍ Doctorate, law, or medical degree
- ❍ Not sure
- ❍ Choose not to respond

Appendix E

Reliability Across Scales

Table 5. Reliability of scales. Shows standardized Cohen's alpha scores.

	Overall	PRE	POST	Year 2	Year 3	Year 4
Science Literacy	0.84	0.83	0.85	0.86	0.85	0.82
STEM Interest	0.82	0.81	0.83	0.85	0.82	0.81
STEM Efficacy	0.87	0.87	0.88	0.88	0.87	0.88
STEM Value	0.81	0.82	0.82	0.88	0.85	0.86
STEM Careers	0.86	0.87	0.85	0.85	0.86	0.86

Note. The reliability for all scales at all years and times reached the acceptable level (Cronbach's $\alpha \geq 0.7$).

Appendix F

Student Survey Demographics, Years 2-4

Table 6. Distribution of student grade.

Grade	*n* Y2	proportion Y2	*n* Y3	proportion Y3	*n* Y4	proportion Y4
5	-	-	-	-	2	0.01
6	7	0.04	0	0.00	7	0.04
7	9	0.05	23	0.06	2	0.01
8	9	0.05	12	0.03	42	0.25
9	6	0.04	43	0.11	18	0.11
10	18	0.11	73	0.18	23	0.14
11	36	0.21	112	0.28	29	0.18
12	84	0.50	138	0.34	42	0.25

Note. We first provided 5th grade as an option in Year 4. All proportions are calculated within the program year.

Table 7. Distribution of student gender.

	n Y2	proportion Y2	n Y3	proportion Y3	n Y4	proportion Y4
Girl	85	0.50	194	0.48	75	0.45
Boy	80	0.47	180	0.45	81	0.49
Non-binary	-	-	-	-	2	0.01
Self-describe	2	0.01	19	0.05	5	0.03
Decline	2	0.01	8	0.02	4	0.02

Note. We first offered 'non-binary' as a gender option in Year 4. All proportions are calculated within the program year.

Table 8. Distribution of student race and ethnicity.

	n Y2	proportion Y2	n Y3	proportion Y3	n Y4	proportion Y4
Asian	15	0.09	23	0.06	14	0.08
Black	23	0.14	71	0.18	26	0.16
Hispanic	22	0.13	71	0.18	29	0.17
Middle Eastern	0	0.00	1	0.00	0	0.00
Multiple	35	0.21	80	0.20	30	0.18
Native American	1	0.01	2	0.00	1	0.01
Other	6	0.04	24	0.06	0	0.00
Pacific Islander	1	0.01	1	0.00	3	0.02
White	67	0.39	129	0.32	51	0.31
Self-Describe	0	0.00	0	0.00	11	0.07
Decline	0	0.00	0	0.00	2	0.01

Note. Single ethnicity groups do not include those who chose multiple ethnic groups. All proportions are calculated within the program year.

Table 9. Distribution of experimental condition assignment.

	n Y2	proportion Y2	n Y3	proportion Y3	n Y4	proportion Y4
Control	85	0.50	230	0.57	53	0.31
Experimental	85	0.50	172	0.43	116	0.69
Total	170		402		169	

Note. All proportions are calculated within the program year.

Appendix G

Teacher Survey Instrument (excl. consent)

Note: underlines indicate edits to prompts for STEM SRL teachers vis-à-vis control teachers.

What prompted you to get involved in SRL and the STEM SRL initiative?

What would you like us to know about the students in your SRL class who worked on the STEM story (e.g. background in filmmaking, interest, access to resources, etc.)?

How do students end up in your course? (e.g. Did they opt into the course? Is there an application process?)

What is their interest / experience with similar topics or courses?

What is their level of motivation?

- ❍ Not at all motivated
- ❍ Slightly motivated
- ❍ Somewhat motivated
- ❍ Moderately motivated
- ❍ Extremely motivated

What SRL materials and resources did you use with your STEM SRL students during the 2017-2018 school year? (Select all that apply)

- ❑ General SRL lesson plans
- ❑ STEM SRL lesson plans
- ❑ Worksheets
- ❑ Badges
- ❑ Production tutorial videos with Gil Garcia
- ❑ Production tutorial videos with Jordan Vesey
- ❑ In-person meeting with public media mentor
- ❑ Online meeting with public media mentor
- ❑ In-person meeting with STEM mentor
- ❑ Online meeting with STEM mentor
- ❑ In-person meeting with the SRL team [list of names included each year]
- ❑ Online meeting with the SRL team [list of names included each year]
- ❑ Other (please specify)

Did you adapt any of the SRL materials?

❍ Yes ❍ No ❍

How did you adapt the materials? [Display only if response to prior question was "yes"]

How did you integrate the materials into your existing classroom plans?

Based on your expertise with students in your community, please reflect on your STEM SRL students in comparison to their peers of similar grade and ability when answering the following question.

How effective was STEM SRL at increasing your students' skills in the following areas?

	Not at all	Slightly	Somewhat	Moderately	Extremely
Research	❍	❍	❍	❍	❍
Writing	❍	❍	❍	❍	❍
Using technology	❍	❍	❍	❍	❍
Communication	❍	❍	❍	❍	❍
Teamwork	❍	❍	❍	❍	❍
Leadership	❍	❍	❍	❍	❍

Did students have preferred roles on the story team (e.g., producer, audio, camera, editor)? Did they become more confident in these roles? Did they explore different roles?

Please continue reflecting on your STEM SRL students in comparison to their peers of similar grade and ability when rating your agreement with the following statements. STEM SRL increased students' interest in...

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
News	❍	❍	❍	❍	❍
Their local community	❍	❍	❍	❍	❍
Journalism careers	❍	❍	❍	❍	❍
STEM topics, including medicine/health science	❍	❍	❍	❍	❍
Medicine/health science topics in particular	❍	❍	❍	❍	❍
STEM careers, including medicine/health science	❍	❍	❍	❍	❍
Medicine/health science careers in particular	❍	❍	❍	❍	❍

How engaged were your students in the STEM SRL projects this year?

- ❍ Not at all engaged
- ❍ Slightly engaged
- ❍ Somewhat engaged
- ❍ Moderately engaged
- ❍ Extremely engaged
- ❍

What do you think was the most impactful part of the STEM project for your students?

Does the STEM SRL curriculum provide students with different opportunities than the regular SRL curriculum? Please explain.

Now we'd like to know more about how SRL – and STEM SRL in particular – have affected you and your teaching. Please rate your agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
The STEM SRL materials and resources helped me to generate productive conversations with my students.	❍	❍	❍	❍	❍
The STEM SRL materials and resources prepared me to answer students' questions.	❍	❍	❍	❍	❍
STEM SRL helped me to reach students with a variety of learning styles..	❍	❍	❍	❍	❍

Which SRL resources or lessons were most helpful? We are interested in both the regular SRL curriculum and the STEM SRL curriculum here.

Are there any resources or lessons that you wish SRL would add or update?

Please rate your agreement with the following statements.

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I felt that I had the appropriate skills and knowledge to address the needs of my STEM SRL students.	❍	❍	❍	❍	❍
I felt comfortable addressing most issues raised by my STEM SRL students.	❍	❍	❍	❍	❍
I was confident in my ability to provide good feedback to my STEM SRL students.	❍	❍	❍	❍	❍

What has been your biggest success implementing STEM SRL?

What has been your biggest challenge?

Do you have any suggestions for improving the SRL program in general or the STEM SRL initiative in particular?

In what type of setting do you teach?

- ❍ Public
- ❍ Private
- ❍ Charter
- ❍ After school program

How would you describe the area where your school / program is located?

- ❍ Urban
- ❍ Suburban
- ❍ Ex-urban
- ❍ Rural
- ❍ Other

Approximately what percent of the students at your school qualify for free or reduced price lunch?

- ❍ 0 to 25%
- ❍ 26 to 50%
- ❍ 51 to 75%
- ❍ 76 to 100%
- ❍ I don't know

Approximately what percent of the students at your school are English language learners?

- ❍ 0 to 25%
- ❍ 26 to 50%
- ❍ 51 to 75%
- ❍ 76 to 100%
- ❍ I don't know

How long have you been part of the SRL program?

- ❍ It's my first year!
- ❍ 2 to 3 years
- ❍ 4 to 5 years
- ❍ More than 5 years

In what type of class did you use the SRL curriculum during the 2018-2019 school year? (Select all that apply)

- ❑ Journalism
- ❑ Media
- ❑ English / Language Arts
- ❑ Social Studies
- ❑ Science
- ❑ Other (please specify)

What is the grade of the students in this class? (Select all that apply)

- ❑ 5th
- ❑ 6th
- ❑ 7th
- ❑ 8th
- ❑ 9th
- ❑ 10th
- ❑ 11th
- ❑ 12th

Appendix H

Mentor Survey Instruments (excl. consent)

Media Mentor Survey

How long have you been a mentor with SRL?

- ❍ It's my first year!
- ❍ 2 to 3 years
- ❍ 4 to 5 years
- ❍ More than 5 years

What motivated you to become an SRL mentor?

How many SRL classes are you providing reflections on in this survey? Note: Please see the survey solicitation email for the names of the schools we would like to hear about today. If you were a mentor for classes not listed in the email and want to provide feedback on your work with them, please contact Leah Clapman (email: lclapman@newshour.org) or Elis Estrada (email: eestrada@newshour.org) directly.

- ❍ One
- ❍ Two
- ❍ Three
- ❍ Other (please explain)

[This determines how later questions are displayed: the following questions were displayed up to three times, with a preamble asking the mentor to think about a specific class.]

During which semester did you work with the SRL students?

- ❍ Fall
- ❍ Spring
- ❍ Both Semesters

What interactions have you had with the SRL students? (Select all that apply)

- ❑ Google Hangout meeting
- ❑ In-person meeting
- ❑ Email correspondence with teacher
- ❑ Email correspondents with students
- ❑ Other (please specify)

Please describe the meetings. For example: How long were they? What did you discuss? What types of questions did students ask? [Display this question only if "Google Hangout" or "In-person meeting" was selected]

How well prepared did you feel for your Google Hangout or in-person visit? [Display this question only if "Google Hangout" or "In-person meeting" was selected]

Please rate your agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I felt that I had the skills and knowledge to address the needs of the students.	❍	❍	❍	❍	❍
I felt comfortable addressing most issues raised by the students.	❍	❍	❍	❍	❍
I was confident about my ability to provide good feedback to the students.	❍	❍	❍	❍	❍
I felt that I knew how to foster the feelings of competence of the students.	❍	❍	❍	❍	❍

How much time did you devote to the SRL mentorship (including preparation time)?

- ❍ Less than one hour per month
- ❍ One to five hours per month
- ❍ Five to ten hours per month
- ❍ More than ten hours per month
- ❍ Other (please specify)

How does this time commitment compare to what you expected?

- ❍ Less than I expected
- ❍ About what I expected
- ❍ More than I expected

Please rate your level of agreement with the following statements about your overall experience as an SRL mentor.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I had enough support from the SRL team.	❍	❍	❍	❍	❍
I had enough support from my partner teacher(s).	❍	❍	❍	❍	❍
I had enough support from my employer.	❍	❍	❍	❍	❍

How has being an SRL mentor affected you or your professional practice? Please explain.

What did you find to be the most positive or rewarding part of being a mentor?

What did you find to be the most challenging or difficult part of being a mentor?

Do you have any suggestions for improving the SRL program or SRL mentorship?

STEM Mentor Survey

What aspects of the SRL mentoring opportunity were attractive to you?

What activities did you do during your SRL mentorship? (Select all that apply)

- ❑ Google Hangout meeting with students
- ❑ In-person meeting with students
- ❑ Review the rough cut of the students' video
- ❑ Email correspondents with students
- ❑ Other (please specify)

Please describe the meeting(s). For example: How long were they? What did you discuss? What types of questions did students ask? [Display this question only if "Google Hangout" or "In-person meeting" was selected]

How well prepared did you feel for the meeting(s)? [Display this question only if "Google Hangout" or "In-person meeting" was selected]

Please rate your agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I felt that I had the skills and knowledge to address the needs of the students.	❍	❍	❍	❍	❍
I felt comfortable addressing most issues raised by the students.	❍	❍	❍	❍	❍
I was confident about my ability to provide good feedback to the SRL students.	❍	❍	❍	❍	❍

During your mentorship, how much time did you devote to the SRL program (including preparation time)?

- ❑ Less than 3 hours
- ❑ 3 – 6 hours
- ❑ More than 6 hours
- ❑ Other (please describe)

How did this time commitment compared to what you expected?

❍ Less than I expected ❍ About what I expected ❍ More than I expected

Has being an SRL mentor affected you or your professional practice? If so, please describe how.

Please rate your level of agreement with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I had enough support from the SRL team.	❍	❍	❍	❍	❍
I had enough support from my partner teacher(s).	❍	❍	❍	❍	❍
I had enough support from my employer.	❍	❍	❍	❍	❍

What did you find to be the most rewarding or positive part of being a mentor?

What was challenging or difficult about being a mentor?

Do you have any suggestions for improving the SRL program or mentorship?

Appendix I

Original Case Study Instruments

Student Focus Group Protocol

Module 1: Welcome and Introduction

We are working with PBS NewsHour to study the SRL program and help to make it even better. Before we jump into that, I'd like to learn a little bit more about you. We'll do this by going around the room and saying our first names and two things you'd want the world to know about you.

<Facilitator & Group Introductions>

I'd like to start with some information about how we will proceed. All of you have something valuable to say and we want to make sure that everyone has a chance to share their thoughts and respects each other's opinions. We will be recording this conversation and taking notes, but everything you say will be anonymized, so no one outside this room will know who said what. There are no right or wrong responses and if anytime along the way you feel there's something important you'd like to share that I haven't specifically asked about, feel free to add that. Do you have any questions about what we're doing or how it will work?

Module 1: Story Making Process

How did you feel when you learned that you would be making a story about STEM?

Why did you choose your particular topic?

> [probe] Was it your first idea? Did you know about it before?
>
> [probe] What central questions were you investigating? Did those questions change over time?
>
> [probe] Who is your intended audience?
>
> [probe] What background research did you do?

What are the different roles associated with making a news story and how did you divide them among your team members?

How did you choose what b-roll to capture?

How did you select who to interview?

> [probe] How did you prepare for the interviews?
>
> [probe] Did anything unexpected happen?

How did you approach the script-writing process?

How did you make sure that the facts in your story were correct?

What was the editing process like?

Module 3: Collaboration & Feedback

Everyone here played a different role in making this story. How did you decide which person would do each task?

> [probe] Were there some roles that everyone/no one wanted to do? How did you solve that problem?

Did you face any challenges while working as a team?

> [probe] How did you overcome them?

What kind of feedback did you get from your classmates?

Can you describe the Google Hangout that you had with [name of scientist]?

Tell us about your STEM mentor.

> [probe] What types of tasks do they help you with?
>
> [probe] Have you learned anything from them that was surprising?
>
> [probe] How did working with your mentor affect you? Was it [interesting, fun, exciting, etc.]?
>
> [probe] Have you learned more about STEM careers from them? What?

Module 4: Broader Impact

Do you or anyone you know have personal opinions on the issues addressed in the story?

> [probe] How do you ensure that those opinions don't distort the final story?

How do you expect your family/friends/community members to respond to your story?

Has making the story affected your interest in learning/discussing science topics?

> [probe] Has it made you more aware of science issues in your local community?
>
> [probe] Are you more likely to talk with your family/friends about science topics?
>
> [probe] Are you more likely to follow science topics in the news?
>
> [probe] Have you taken any actions (e.g., join a club, follow certain news topics) as a result of your interest?
>
> [probe] Has working on this story made you more interested in science topics in general?

Module 5: SRL Themes (Optional)

SRL is in the process of choosing a theme for next year's STEM stories – last year that theme was national parks and this year it was problem solving and engineering. They want the theme to be interesting for teenagers and also something where teens might have a unique perspective that isn't usually heard in the normal news cycle. Do you have any suggestions for STEM themes for next year?

Module 6: Conclusion

Well those were all the questions that we wanted to ask. Is there anything else you wanted to add?

We appreciate your sharing your views and experiences with us as we work to improve this program.

Peer Focus Group Protocol

Module 1: Welcome & Introduction

We are here to talk to you about how you get access to news and what topics you care about. Before we jump into that, I'd like to learn a little bit more about you. We'll do this by going around the room and saying our first names and two things you'd want the world to know about you.

<Facilitator & Group Introductions>

I'd like to start with some information about how we will proceed. All of you have something valuable to say and we want to make sure that everyone has a chance to share their thoughts and respects each other's opinions. We will be recording this conversation and taking notes, but everything you say will be anonymized, so no one outside this room will know who said what. There are no right or wrong responses and if anytime along the way you feel there's something important you'd like to share that I haven't specifically asked about, feel free to add that. Do you have any questions about what we're doing or how it will work?

Module 2: Interest and Access to News

What is one piece of news that you've heard about recently? This piece of news could be on any topic.

> [probe] What about that news story intrigued you?

What is one piece of science news that you've heard about recently?

> [probe] Why did you find interesting?

How do you usually get your science news (e.g., newspaper, websites, social media, school, word of mouth)?

> [probe] What sources do you trust to provide reliable science news (e.g., friends/family, teachers, broadcast media)? Why?
>
> [probe] What sources might you be less likely to trust to provide reliable science news? Why?
>
> [probe] If a friend sent you a link about a science news story, would you read it? Why or why not?

Module 3: Reactions to Rough Cut Videos

We will now watch a rough cut version of a story that SRL students have been working on this semester [or videos from last year if the rough cut is not available]. We would like to get

your reactions to this video, so as you watch, please take note of the thoughts and feelings that it prompts for you. [Watch video]

What are your initial reactions to the video?

> [probe] Were you excited? Skeptical? Bored?
>
> [probe, if they are particularly shy] We're not going to tell your peers what you say – it's okay to be critical.

Did you know anything about this topic before you saw this video?

> [probe] Did you learn anything surprising?
>
> [probe] Are you interested in learning more about this topic?

Do you feel like this story is relevant to you? Why?

Do you feel like this story is relevant to other people in your community?

> [probe] Who do you think of as your "community"? Why?

Module 4: Teens as News Sources

How likely are you to watch a news story that is produced by teens?

Do you think that adults will watch a teen-produced news story? Would they take it seriously? Why or why not?

Do you think it's valuable to for news consumers to watch stories produced by teens? Why or why not?

Module 5: SRL Themes (Optional)

SRL is in the process of choosing a theme for next year's STEM stories – last year that theme was national parks and this year it was problem solving and engineering. They want the theme to be interesting for teenagers and also something where teens might have a unique perspective that isn't usually heard in the normal news cycle.

Do you have any suggestions for STEM themes for next year?

Module 6: Conclusion

Well those were all the questions that we wanted to ask of you. Is there anything else you wanted to add?

We appreciate your sharing your views and experiences with us as we work to improve this program.

Teacher Interview Protocol

Module 1: Welcome and Introduction

Thank you so much for taking the time to talk with us. I'm [NAME] and I work at New Knowledge Organization.

<Interviewer and NewKnowledge background>

Our goal for this interview is to find out how you have been implementing the program, your perceptions of students' STEM and media literacy and interests, and any ways that we can better support you. Before we jump in, I'd like to ask your permission to record our conversation. This will help me focus on what you're saying rather than taking notes, and won't be shared outside of the evaluation team.

[If YES, record.] Great – let's get started.

[If NO] Okay, I will be jotting down some notes as we speak.

Module 2: Context

I understand you're a [SUBJECT] teacher here at [NAME OF SCHOOL]. I'd like to hear a bit more about you and your role as an SRL teacher. Could you tell us more about yourself and your interest in SRL?

[probe] How long have you been teaching?

[probe] How did you hear about SRL and what prompted you to get involved?

[probe] Why were you interested in using the STEM curriculum?

[probe] When you started, what were your expectations for SRL? For the STEM curriculum?

Can you tell us more about your SRL class and students?

[probe] How often does your class meet?

[probe] How do students end up in your class? Are students opting into this course or is it a requirement?

[probe] Were any students in a previous SRL class? Have they worked on STEM stories in the past?

[probe] Were they interested in STEM topics before joining the class?

Can you tell us about your experience using the STEM SRL curriculum so far?

[probe] How did you use the STEM SRL curriculum (e.g., as the main course curriculum, supplementing your own curriculum, in combination with the regular SRL curriculum)?

[probe] What SRL resources did you use (e.g., lesson plans, worksheets, prompts)

Module 3: Student Outcomes

What were your students' reactions to the idea of making a STEM news story (e.g., excited, skeptical, indifferent)?

Can you describe how you led your students though the story development process?

[probe] How were they divided into teams? What did the collaboration process look like?

[probe] What parts of the process did they need the most support on? Were there other parts where they were able to work more independently?

[probe] Which parts of the process did they find the most/least exciting?

Please tell us about the interactions with your students' STEM and media mentors.

[probe] How often do you and your students interact with your mentors? What do those interactions look like?

What skills do you think your students developed while working on their stories?

[probe] Did you see more changes in their soft skills (e.g., teamwork, leadership, communication), hard skills (e.g., filming, editing) or both?

[probe] Can you tell us about a moment that gave you insight into their learning process?

[probe] Do you think their interactions with their mentors affected their learning?

Do you think that making their STEM story has affected their knowledge of science? Of journalism?

[probe] What skills do you think they have developed?

[probe] What areas could they use more help with?

Do you think that making their STEM story has affected their attitudes towards science? Towards journalism?

[probe] Can you tell us about a moment that gave you insight into their attitudes?

[probe] Do you think their interactions with their mentors affected their attitudes?

Module 4: General Feedback

What parts of the curriculum did you enjoy teaching the most? What parts did the students enjoy the most?

What was the most challenging part of the curriculum/using the curriculum for you (e.g., time, student engagement)?

[probe] How might the SRL team help with that challenge?

What part of the curriculum did the students find most challenging?

[probe] How might the SRL team help with that challenge?

Module 5: Conclusion

Those were all the questions that we wanted to ask. Is there anything else you wanted to add that you think may help us to improve the program?

Thank you so much for your time! We appreciate your sharing your views and experiences with us as we work to improve this program.

Mentor Interview Protocol

Module 1: Introduction and Consent

Thank you so much for taking the time to talk with us. I'm [NAME] and I work at New Knowledge Organization.

<Interviewer and NewKnowledge background>

Our goal for this interview is to find out about your experiences as a mentor, your perceptions of students' STEM and media interests, and any ways that we can better support you.

Before we jump in, I'd like to ask your permission to record our conversation. This will help me focus on what you're saying rather than taking notes, and won't be shared outside of the evaluation team.

[If YES, record.] Great – let's get started.

[If NO] Okay, I will be jotting down some notes as we speak

Module 2: Context

I understand you're a [POSITION] at [EMPLOYER]. I'd like to hear a bit more about your background and your role as an SRL mentor. Could you tell us more about yourself?

[probe] How long have you worked for [EMPLOYER]?

[probe] What are your primary responsibilities / research focus?

[probe] Have you been a mentor for middle/high school students in the past?

How did you hear about SRL and what prompted you to get involved?

[probe] When you started, what were your expectations for SRL? For the STEM curriculum?

Module 3: SRL Experiences

Can you tell me about your interactions with the SRL teacher?

[probe] How often did you communicate with the teacher?

[probe] What did you discuss (e.g., logistics, SRL curriculum)?

Can you describe your interactions with SRL students?

[probe] Have you visited the class? What did you do when you were there?

[probe] Have you had a chance to Google Hangout with the class? Was Google Hangout an effective way to communicate with the class? What did you discuss?

[probe] Did you prepare for those meetings? If so, how?

Module 4: Student Outcomes

What part(s) of the story-making process did you see?

[probe] What kind of feedback did you provide? How did students respond to that feedback?

What kind of questions did students ask you (e.g., feedback on their pieces, job/career, STEM/media content)?

Do you think that making their STEM story has affected their knowledge of science? Of journalism?

[probe] What skills do you think they have developed?

[probe] What areas could they use more help with?

Do you think that making their STEM story has affected their attitudes towards science? Towards journalism?

[probe] Can you tell us about a moment that gave you insight into their attitudes?

[probe] Do you think that your interactions with them affected their attitudes?

Module 5: General Feedback

What parts of the curriculum did you enjoy teaching the most? What parts did the students enjoy the most?

What was the most challenging part of being a mentor (e.g., time, technology)?

[probe] How might the SRL team help with that challenge?

Module 6: Conclusion

Those were all the questions that we wanted to ask. Is there anything else you wanted to add that you think may help us to improve the program and curriculum?

Great, thank you so much for your time! We really appreciate your sharing your views and experiences with us as we work to improve this program.

Appendix J

Year 4 Case Study Instruments

Teacher Interview Protocol

Module 1: Welcome and Introduction

Thank you so much for taking the time to talk with us. I'm [NAME] and I work at New Knowledge Organization, and our conversation will last for about an hour.

<Interviewer and NewKnowledge background>

Our goal for this interview is to find out how you have been implementing the program, your perceptions of students' STEM and media literacy and interests, and any ways that we can better support you. Before we jump in, I'd like to ask your permission to record our conversation. This will help me focus on what you're saying rather than taking notes, and won't be shared outside of the evaluation team. We also want you to know that your name won't show up in any of our reports. We anonymize the data, meaning no one will know who said what. We do this to help interviewees feel comfortable to speak freely and honestly.

> [If YES, record.] Great – let's get started.
>
> [If NO] Okay, I will be jotting down some notes as we speak.

Module 2: Context

I understand you're a [SUBJECT] teacher here at [NAME OF SCHOOL]. I'd like to hear a bit more about you and your role as an SRL teacher. Could you tell us more about yourself and your interest in SRL? For these first questions, just think about the regular SRL curriculum. I'll be asking specific questions about STEM SRL a little bit later.

> [probe] How long have you been teaching? (overall, not just SRL classes)
>
> [probe] How long have you been involved with SRL?
>
> [probe] How did you hear about SRL and what prompted you to get involved?
>
> [probe] When you started, what were your expectations for SRL? I am interested to hear about both expectations for your experience and for your students. Have those expectations changed over time?

How do you understand STEM? [Note to interviewer: we are particularly interested in greater-than-sum-of-parts vs. any of the fields]

Tell me a bit about any previous experience you had with STEM before starting the STEM SRL program.

> [probe] Have you taught STEM courses in the past? [alt probe] Have you made connections to STEM in your other courses?

Why were you interested in using the STEM curriculum?

[probe] What were your expectations for the STEM curriculum? Once again, I'm interested in both expectations for your own experience and for your students. Have those expectations changed over time?

[probe] What did you anticipate would be challenging for you?

[probe] As a teacher what did you hope you could achieve by working with the SRL program?

Can you tell us about your experience using the STEM SRL curriculum so far?

[probe] How did you use the STEM SRL curriculum (e.g., as the main course curriculum, supplementing your own curriculum, in combination with the regular SRL curriculum)?

[probe] What SRL resources did you use (e.g., lesson plans, worksheets, prompts)

[probe] What was difficult for you? What kind of support did you need?

Module 3: Curriculum

What parts of the curriculum were most enjoyable for you as a teacher? What parts did the students enjoy the most?

What was the most challenging part of the curriculum/using the curriculum for you (e.g., time, student engagement)?

[probe] How might the SRL team help with that challenge?

What part of the curriculum did the students find most challenging?

[probe] How might the SRL team help with that challenge?

Module 4: Mentor Relationships

Thinking back about this past year and prior SRL years, please tell us about the interactions with your students' STEM and media mentors.

[probe] How often do you and your students interact with your mentors? What did those interactions look like?

[probe] What did your **students** get out of the relationship with the mentors?

[probe] What did **you** get out of the relationship with the mentors?

[probe] How do you think the mentors felt about their experience? (How do you know? Did they give you any feedback?)

Module 5: Teacher Outcomes

What skills do you think you developed by supporting students in working on STEM stories?

Do you think that working with students on the STEM story has affected your knowledge of science? Of journalism?

[probe] What skills do you think you have developed?

[probe] What areas could you use more help with?

Do you think that working with students on the STEM story has affected your attitudes towards science? Towards journalism?

[probe] Are there STEM topics you're now interested in learning more about?

Module 6: Conclusion

Those were all the questions that we wanted to ask. Is there anything else you wanted to add that you think may help improve the program? How about anything you think we should know that we didn't ask you about specifically?

Thank you so much for your time! We appreciate your sharing your views and experiences with us as we work to improve this program.

Mentor Interview Protocol

Module 1: Introduction and Consent

Thank you so much for taking the time to talk with us. I'm [NAME] and I work at New Knowledge Organization. As we said in our invitation, we're the external evaluators for the SRL program where you were a mentor.

<Interviewer and NewKnowledge background>

Our goal for this interview is to find out about your experiences as a mentor, your perceptions of students' STEM and media interests, and any ways the program can better support mentors like you.

We're evaluating the PROGRAM as a whole, not the particular class. If something didn't work for you, it's helpful to hear about it so we can provide suggestions on how to improve.

Before we jump in, I'd like to ask your permission to record our conversation. This will help me focus on what you're saying rather than taking notes, and won't be shared outside of the evaluation team. We also want you to know that your name won't show up in any of our reports. We anonymize the data, meaning no one will know who said what. We do this to help interviewees feel comfortable to speak freely and honestly.

[If YES, record.] Great – let's get started.

[If NO] Okay, I will be jotting down some notes as we speak

Module 2: Context

I understand you're a [POSITION] at [EMPLOYER]. I'd like to hear a bit more about your background and your role as an SRL mentor. Could you tell us more about yourself?

[probe] How long have you worked for [EMPLOYER]?

[probe] What are your primary responsibilities / research focus?

[probe] Have you been a mentor for middle/high school students in the past? What was your experience like?

How did you hear about SRL and what prompted you to get involved?

[probe] How long have you been involved?

[probe] When you started, what were your expectations for SRL? For the STEM curriculum?

[probe] How familiar were you with STEM journalism before you started working with the SRL program?

[probe for STEM mentors:] Tell me a bit about your experience communicating science/STEM to the public in the past.

[probe for media mentors:] How familiar / comfortable were you with STEM topics before you started working with the SRL program?

Module 3: SRL Experiences

Can you tell me about your interactions with the SRL teacher?

[probe] How often do you communicate with the teacher?

[probe] What do you discuss (e.g., logistics, SRL curriculum)?

[probe] Do you feel like your roles complement one another? How do they fit together in mentoring students?

Can you describe your interactions with SRL students?

[probe] Have you visited the class? What did you do when you were there?

[probe] Have you had a chance to Google Hangout with the class? Was Google Hangout an effective way to communicate with the class? What did you discuss?

[probe] Did you prepare for those meetings? If so, how?

Module 4: Student Outcomes

What part(s) of the story-making process were you involved in?

[probe] What kind of feedback did you provide? How did students respond to that feedback?

What kind of questions did students ask you (e.g., feedback on their pieces, job/career, STEM/media content)?

Do you think that making their STEM story has affected their knowledge of science? Of journalism?

[probe] What skills do you think they have developed? How do you know this?

[probe] What areas could they use more help with? Why do you think this is the case?

Do you think that making their STEM story has affected their attitudes towards science? Towards journalism?

[probe] Can you tell us about a moment that gave you insight into their attitudes?

[probe] Do you think that your interactions with them affected their attitudes?

Module 5: Challenges

What was the most challenging part of being a mentor (e.g., time, technology)?

[probe] How might the SRL team help with that challenge?

[probe] Are you planning to continue as a SRL mentor? If co, what will you plan on doing differently next time?

Module 6: Conclusion

Those were all the questions that we wanted to ask. Is there anything else you wanted to add that you think may help us to improve the program and curriculum? Is there anything you think is important for us to know that we didn't ask about specifically?

Great, thank you so much for your time! We really appreciate your sharing your views and experiences with us as we work to improve this program.

Appendix K

Film Festival Protocol

Thank you for participating in the STEM SRL Film Festival! PBS is so excited to be working with you. We hope you're excited too!

In addition to determining the winner of the film festival, your responses may be used for research purposes to assess the impact of the SRL program.

By clicking the next button below, you acknowledge that you agree to participate.

Thank you for your time!

Which news stories taught you the most about STEM (science, technology, engineering, and mathematics)? Please rank your top 3 and describe the most valuable thing you learned from each one. Incomplete ballots will not be judged.

First place:

What was the most valuable thing you learned from this film?

Second place:

What was the most valuable thing you learned from this film?

Third place:

What was the most valuable thing you learned from this film?

Had you heard about the story produced at your school before you saw it today?

❍ Yes ❍ No ❍ Not sure

Tell us who you are and why you are here. Please select all that apply

❑ I worked on one of the news stories in the festival

❑ I'm a student in SRL who did not work on one of the news stories in the festival

❑ I'm a student in the school who is not in SRL

❑ Family member of a student who worked on a news story in the festival

❑ Family member of a student who didn't work on one of the news stories

❑ Teacher at the school

❑ Other (please specify)

How did you hear about the festival?

Appendix L

Teacher Use of SRL Materials and Resources

In surveys, a total of 10 experimental and 9 control teachers reported using general SRL lesson plans in their Labs. Of the 17 experimental teachers, 13 said that they used the STEM SRL lessons in their labs. Teachers in both control and experimental groups reported using production tutorial videos and worksheets frequently as well as availing themselves of regular online meetings with the SRL team. Experimental groups reported more interactions with their public media mentor through both online and in person meetings (*n* = 9) than control teachers (*n* = 3). About half of the 17 experimental teachers reported meeting with the STEM mentor either online or in person (Figure 1).

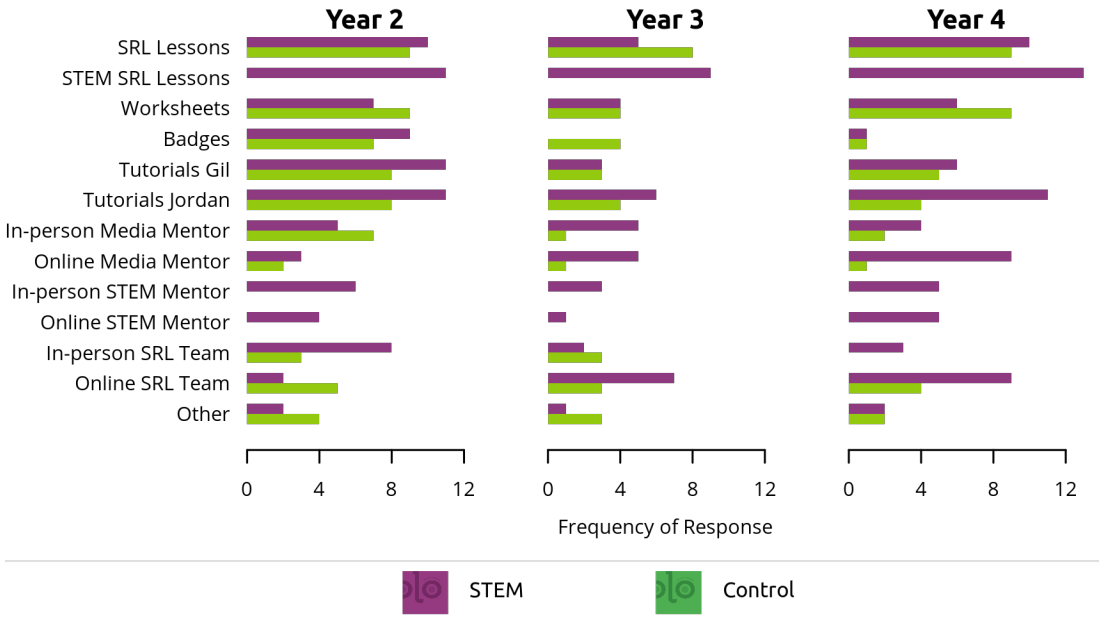

Figure 1. *What SRL materials and resources did you use with your (STEM) SRL students during [this] school year?*

Notes. Year 2, Control *n* = 10 and STEM *n* = 12; Year 3, Control *n* = 9 and STEM *n* = 9; Year 4, Control *n* = 10 and STEM *n* = 17.
Write-in *Other* responses most frequently referred to online and in-person interactions with the SRL team, including the use of frame.io to provide feedback.

On average, teachers used four types of resources in their Labs. Seventeen out of 27 teachers surveyed said that they adapted the SRL materials to some degree. More experimental teachers (*n* = 12) adapted these lessons than control teachers (*n* = 5).

Knology

Behaviors

Biosphere

Culture

Media

Wellness

Systems

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