

Virtual STEM Program Positives and Pitfalls – Brown, Morris et al.  
Appendix. Supplementary Tables.

**Table S1.** Example schedule for GEMS students from Monday through Wednesday each week. Each student would ultimately receive 3 morning lessons, and 6 afternoon lessons (“LP” or “lesson plan”).

MONDAY-WEDNESDAY eGEMS TEACHING SCHEDULE												
	ENGINEERING				BIOMEDICAL				BIOMEDICAL			
	NPM 1	NPM 2	NPM 3	NPM 4	NPM 5	NPM 6	NPM 7	NPM 8	NPM 9	NPM 10	NPM 11	NPM 12
9:00												
9:15	NPM 1's Lesson Plan Taught by NPM 1-4				NPM 5's Lesson Plan taught by NPM 5-8				NPM 9's Lesson Plan taught by NPM 9-12			
9:30												
9:45												
10:00												
10:15												
10:30												
10:45												
11:00	LUNCH: 11AM-1PM											
...												
1:00	Afternoon LP 1	Afternoon LP 1	Afternoon LP 2	Afternoon LP 2	Afternoon LP 3	Afternoon LP 3	Afternoon LP 4	Afternoon LP 4	Afternoon LP 5	Afternoon LP 5	Afternoon LP 6	Afternoon LP 6
1:15					Afternoon LP 3	Afternoon LP 3	Afternoon LP 4	Afternoon LP 4	Afternoon LP 5	Afternoon LP 5	Afternoon LP 6	Afternoon LP 6
1:30	Afternoon LP 1	Afternoon LP 1	Afternoon LP 2	Afternoon LP 2	Afternoon LP 3	Afternoon LP 3	Afternoon LP 4	Afternoon LP 4	Afternoon LP 5	Afternoon LP 5	Afternoon LP 6	Afternoon LP 6
1:45					Afternoon LP 3	Afternoon LP 3	Afternoon LP 4	Afternoon LP 4				
2:00					KAHOOT							
2:15	Afternoon LP 1	Afternoon LP 1	Afternoon LP 2	Afternoon LP 2								
2:30												
2:45												
3:00												
	STUDENT GROUP A				STUDENT GROUP B				STUDENT GROUP C			

**Table S2.** Example schedule for GEMS students on Thursdays. Each student would engage in 1 morning lesson, then take the GEMS survey (unless they opt out), and participate in a series of shorter afternoon activities, including “Guess that NPM” – a trivia game, as well as an end-of-program graduation ceremony.

THURSDAY eGEMS TEACHING SCHEDULE												
	ENGINEERING				BIOMEDICAL				BIOMEDICAL			
	NPM 1	NPM 2	NPM 3	NPM 4	NPM 5	NPM 6	NPM 7	NPM 8	NPM 9	NPM 10	NPM 11	NPM 12
9:00												
9:15												
9:30												
9:45												
10:00	CLIMATE SUMMIT- ALL GROUPS											
10:15												
10:30												
10:45												
11:00	LUNCH: 11AM - 1PM											
...												
1:00	Bug Hour and AEOP Youth Survey				Bug Hour and AEOP Youth Survey				Bug Hour and AEOP Youth Survey			
1:15												
1:30	Guess That NPM				Guess That NPM				Guess That NPM			
1:45												
2:00	End of Week Ceremony				End of Week Ceremony				End of Week Ceremony			
2:15												
2:30												
2:45												
3:00												

**Table S3.** Statistical details associated with our analyses of GEMS' program fidelity across years and by underrepresented (U2) status.

Survey Question	2019 versus 2020		2019 versus 2020 by U2 status						Medians and Means		Interpretation
	p value	W	p value (U2 status)	Regression Coefficient ( $\beta$ )	t	p value (year)	Regression Coefficient ( $\beta$ )	t	2019	2020	
STEM_Practices_Q13 How often did you do each of the following in GEMS this year?: Plan my own research based on my ideas	0.037	45630	0.3631	-0.05958	t = -0.3505	0.78257	0.13548	t = 0.7816	2019 All: 2.0, 1.709 2019 Not U2: 2.0, 1.722 2019 U2: 2.0, 1.675	2020 All: 2.666, 1.966 2020 Not U2: 1.333, 1.858 2020 U2: 2.0, 1.822	Increased in 2020
STEM_Practices_Q16 How often did you do each of the following in GEMS this year?: Use scientific(2020)/laboratory(2019) tools and steps to do an experiment	<0.001	62408	0.543	0.01952	t = 0.1092	0.003	-0.51432	t = -2.8109	2019 All: 4.0, 3.201 2019 Not U2: 4.0, 3.262 2019 U2: 4.0, 3.11	2020 All: 2.666, 2.864 2020 Not U2: 2.666, 2.882 2020 U2: 3.333, 3.1333	Declined in 2020
STEM_Practices_Q18 How often did you do each of the following in GEMS this year?: Examine data or information to make a conclusion or decision	0.593	51049	0.678	0.08118	t = 0.4617	0.725	0.10866	t = 0.5986	2019 All: 3.0, 2.926 2019 Not U2: 3.0, 2.928 2019 U2: 3.0, 2.921	2020 All: 2.666, 2.955 2020 Not U2: 2.666, 2.976 2020 U2: 4.0, 3.155	No change across years or by U2 status
STEM_Practices_Q19 How often did you do each of the following in GEMS this year?: Work with others as part of a team or group	<0.001	65059	0.387	-0.05689	t = -0.2861	<0.001	-1.01675	t = -5.093	2019 All: 4.0, 3.543 2019 Not U2: 4.0, 3.59 2019 U2: 4.0, 3.479	2020 All: 2.666, 3.042 2020 Not U2: 4.0, 3.057 2020 U2: 4.0, 3.155	Declined in 2020
*PROGRAM_SATISFACTION_Q3a - Did you experience teaching/mentorship during GEMS?	0.256	43735	0.636	-0.4776	z = -0.474	0.994	17.3979	z = 0.008	2019 All: 1.0, 0.9847 2019 Not U2: 1.0, 0.9875 2019 U2: 1.0, 0.98	2020 All: 1.0, 0.9941 2020 Not U2: 1.0, 1.0 2020 U2: 1.0, 1.0	No change across years or by U2 status
*PROGRAM_SATISFACTION_Q3b If you experienced teaching/mentorship during GEMS, how satisfied were you with the teaching/mentorship?	0.335	41678	0.998	0.6692	t = 2.8381	0.837	0.2236	t = 0.9848	2019 All: 3.0, 2.562 2019 Not U2: 3.0, 2.494 2019 U2: 3.0, 2.663	2020 All: 3.0, 2.646 2020 Not U2: 3.0, 2.545 2020 U2: 3.0, 2.775	No change across years or by U2 status
STEM_CAREERS How many jobs/careers in STEM did you learn about during GEMS?	0.094	39672	0.767	0.1339	t = 0.7298	0.961	0.3265	t = 1.7757	2019 All: 4.0, 3.62 2019 Not U2: 4.0, 3.59 2019 U2: 4.0, 3.66	2020 All: 4.0, 3.869 2020 Not U2: 4.0, 3.828 2020 U2: 4.0, 4.05	No change across years or by U2 status

**Table S4.** Statistical details associated with our analyses of GEMS student attitudes toward STEM education across years and by underrepresented (U2) status.

Survey Question	2019 versus 2020		2019 versus 2020 by U2 status						Medians and Means		Interpretation
	p value	W	p value (U2 status)	Regression Coefficient (β)	t or z	p value (year)	Regression Coefficient (β)	t or z	2019	2020	
MENTORING STRATEGIES Q1 Please mark yes or no below to indicate if your instructor used each of the items below in your program.:Helped me learn about STEM in my everyday life	0.07	41044	0.34	0.3632	z = 0.961	0.16	0.5413	z = 1.398	2019 All: 1.0, 0.8937 2019 Not U2: 1.0, 0.8958 2019 U2: 1.0, 0.8974	2020 All: 1.0, 0.9347 2020 Not U2: 1.0, 0.9833 2020 U2: 1.0, 0.9091	No change across years or by U2 status
MENTORING STRATEGIES Q2 Please mark yes or no below to indicate if your instructor used each of the items below in your program.:Helped me understand how I can use STEM to improve my community	0.35	41910	0.67	0.1454	z = 0.430	0.13	0.5374	z = 1.508	2019 All: 1.0, 0.8745 2019 Not U2: 1.0, 0.8646 2019 U2: 1.0, 0.8854	2020 All: 1.0, 0.8991 2020 Not U2: 1.0, 0.9667 2020 U2: 1.0, 0.899	No change across years or by U2 status
FUTURE INTEREST Q4a Did you know about GEMS?	0.24	37605	0.43	-0.2229	z = -0.796	0.02	0.6729	z = 2.244	2019 All: 1.0, 0.8017 2019 Not U2: 1.0, 0.7471 2019 U2: 1.0, 0.8322	2020 All: 1.0, 0.8398 2020 Not U2: 1.0, 0.8687 2020 U2: 1.0, 0.9167	Increase in 2020
FUTURE INTEREST Q4b How interested are you in participating in GEMS in the future?	0.01	23200	1	0.6807	t = 2.624	1	0.6533	t = 2.672	2019 All: 2.0, 1.532 2019 Not U2: 2.0, 1.496 2019 U2: 2.0, 1.585	2020 All: 2.0, 1.671 2020 Not U2: 2.0, 1.628 2020 U2: 2.0, 1.818	Increase in 2020
STEM INTEREST Q6 After your GEMS program, are you MORE or LESS likely to choose to do each of the following outside of school requirements or activities?:Mentor or teach other students about STEM	0.59	36750	0.72	0.1144	t = 0.5959	0.98	0.388	t = 2.0782	2019 All: 3.0, 2.763 2019 Not U2: 3.0, 2.703 2019 U2: 3.0, 2.869	2020 All: 2.67, 2.87 2020 Not U2: 2.67, 3.139 2020 U2: 2.67, 2.957	No change across years or by U2 status
STEM INTEREST Q7 After your GEMS program, are you MORE or LESS likely to choose to do each of the following outside of school requirements or activities?:Help with a community service project related to STEM	0.47	36752	0.99	0.4222	t = 2.205	0.96	0.3312	t = 1.771	2019 All: 3.0, 2.827 2019 Not U2: 3.0, 2.734 2019 U2: 3.0, 3.0	2020 All: 2.67, 2.988 2020 Not U2: 2.67, 3.113 2020 U2: 2.67, 3.157	No change across years or by U2 status
STEM INTEREST Q8 After your GEMS program, are you MORE or LESS likely to choose to do each of the following outside of school requirements or activities?:Participate in a STEM camp, club, or competition	0.04	34520	0.72	0.1094	t = 0.5697	0.99	0.4491	t = 2.3740	2019 All: 3.0, 2.903 2019 Not U2: 3.0, 2.864 2019 U2: 3.0, 2.953	2020 All: 2.67, 3.155 2020 Not U2: 2.67, 3.234 2020 U2: 2.67, 3.201	Decrease in 2020
STEM INTEREST Q9 After your GEMS program, are you MORE or LESS likely to choose to do each of the following outside of school requirements or activities?:Take an extra STEM class	0.25	36151	0.89	0.2378	t = 1.233	0.98	0.3937	t = 2.094	2019 All: 3.0, 2.872 2019 Not U2: 3.0, 2.807 2019 U2: 3.0, 2.998	2020 All: 2.67, 3.024 2020 Not U2: 2.67, 3.153 2020 U2: 2.67, 3.134	No change across years or by U2 status
OVERALL IMPACT Q1 Which of the following statements describe you AFTER participating in the GEMS program?:I am more confident in my STEM knowledge, skills, and abilities	0.45	31396	0.81	0.2133	t = 0.8810	0.22	-0.189	t = -0.7789	2019 All: 1.0, 1.263 2019 Not U2: 1.0, 1.241 2019 U2: 1.0, 1.284	2020 All: 1.0, 1.236 2020 Not U2: 1.0, 1.198 2020 U2: 1.0, 1.259	No change across years or by U2 status

**Table S5.** Statistical details associated with our analyses of GEMS student attitudes toward STEM careers across years and by underrepresented (U2) status.

Survey Question	2019 versus 2020		2019 versus 2020 by U2 status					Medians and Means		Interpretation	
	p value	W	p value (U2 status)	Regression Coefficient ( $\beta$ )	t or z	p value (year)	Regression Coefficient ( $\beta$ )	t or z	2019		2020
OVERALL_IMPACT_Q5 Which of the following statements describe you AFTER participating in the GEMS program?:I am more interested in pursuing a STEM career	0.3314	23742	0.627481	0.08073	t= 0.3255	0.271998	-1.4921	t= -0.6075	2019 All: 1.0, 1.232 2019 Not U2: 1.0, 1.206 2019 U2: 1.0, 1.268	2020 All: 1.0, 1.181 2020 Not U2: 1.0, 1.221 2020 U2: 1.0, 1.174	No change across years or by U2 status
OVERALL_IMPACT_Q4 - Which of the following statements describe you AFTER participating in the GEMS program?:I am more interested in earning a STEM degree	0.7101	23152	0.549576	0.03115	t= 0.1247	0.343036	-0.0988	t= -0.4046	2019 All: 1.0, 1.229 2019 Not U2: 1.0, 1.224 2019 U2: 1.0, 1.254	2020 All: 1.0, 1.215 2020 Not U2: 1.0, 1.238 2020 U2: 1.0, 1.2	No change across years or by U2 status
STEM_CONFIDENCE_Q2020B - Mark for each item how much you agree with each statement.:I am interested in working with mentors who work in STEM*	0.866	2927.5							NA - only one year's data	2020 All: 2.0, 2.409 2020 Not U2: 3.0, 2.465 2020 U2: 3.0, 2.417	No change by U2 w/in 2020
FUTURE_INTEREST_Q12A - Have you heard of the GEMS NPM Program	0.1352	36925	0.803818	-0.05786	z=-0.248	0.000727	0.82073	z=3.379	2019 All: 1.0, 0.6438 2019 Not U2: 1.0, 0.6643 2019 U2: 1.0, 0.6136	2020 All: 1.0, 0.7033 2020 Not U2: 1.0, 0.7879 2020 U2: 1.0, 0.8333	Increase in knowledge of the NPM program in 2020
FUTURE_INTEREST_Q12B - How interested are you in participating in the following programs in the future?:GEMS Near Peer Mentor Program	0.04636	19689	0.489694	-0.006284	t= -0.02586	0.103326	-0.296866	t=-1.26581	2019 All: 2.0, 1.48 2019 Not U2: 2.0, 1.463 2019 U2: 2.0, 1.519	2020 All: 1.0, 1.363 2020 Not U2: 2.0, 1.436 2020 U2: 1.0, 1.32	Decrease in interest in the NPM program in 2020
FUTURE_INTEREST_Q7A - Have you heard of SEAP?	0.1802	37021	0.9851	0.003939	z=0.019	0.0292	0.456266	z=2.181	2019 All: 0.0, 0.4979 2019 Not U2: 0.0, 0.4577 2019 U2: 1.0, 0.5618	2020 All: 1.0, 0.5549 2020 Not U2: 1.0, 0.6667 2020 U2: 1.0, 0.5167	Increase in knowledge of SEAP in 2020
FUTURE_INTEREST_Q7B - How interested are you in participating in the following programs in the future? SEAP	0.05199	12120	0.676287	0.1331	t=0.458	0.214395	-0.2201	t=-0.7928	2019 All: 2.0, 1.56 2019 Not U2: 2.0, 1.585 2019 U2: 2.0, 1.52	2020 All: 2.0, 1.417 2020 Not U2: 2.0, 1.455 2020 U2: 2.0, 1.516	No change in interest in SEAP by year or by U2 status
FUTURE_INTEREST_Q8A - Have you heard of REAP?	0.0521	35534	0.7611	0.06458	z=0.304	0.0022	0.642	z=3.061	2019 All: 0.0, 0.4391 2019 Not U2: 0.0, 0.4085 2019 U2: 0.0, 0.4884	2020 All: 1.0, 0.5223 2020 Not U2: 1.0, 0.6263 2020 U2: 1.0, 0.55	Increase in knowledge of REAP in 2020
FUTURE_INTEREST_Q8B - How interested are you in participating in the following programs in the future?: REAP	0.1618	9700	0.781709	0.22847	t=0.7796	0.37443	-0.08948	t=-0.3206	2019 All: 2.0, 1.455 2019 Not U2: 2.0, 1.448 2019 U2: 2.0, 1.452	2020 All: 1.0, 1.341 2020 Not U2: 1.0, 1.403 2020 U2: 2.0, 1.455	No change in interest in REAP by year or by U2 status
FUTURE_INTEREST_Q9A - Have you heard of HSAP?	0.4386	37147	0.2719	0.2324	z=1.099	0.1121	0.3307	z=1.589	2019 All: 0.0, 0.4298 2019 Not U2: 0.0, 0.4043 2019 U2: 0.0, 0.4824	2020 All: 0.0, 0.4629 2020 Not U2: 1.0, 0.5051 2020 U2: 1.0, 0.533	No change across years in knowing about HSAP
FUTURE_INTEREST_Q9B - How interested are you in participating in the following programs in the future?: HSAP	0.07159	8566.5	0.739668	0.1939	t = 0.6436	0.273572	-0.1777	t= -0.6032	2019 All: 2.0, 1.51 2019 Not U2: 2.0, 1.509 2019 U2: 2.0, 1.512	2020 All: 1.0, 1.353 2020 Not U2: 2.0, 1.4 2020 U2: 2.0, 1.5	No change in interest in HSAP by year or by U2 status
FUTURE_INTEREST_Q10A - Have you heard of CQL?	0.3262	36850	0.528	0.1375	z=0.632	0.552	0.1274	z=0.594	2019 All: 0.0, 0.3509 2019 Not U2: 0.0, 0.3191 2019 U2: 0.0, 0.4118	2020 All: 0.0, 0.3917 2020 Not U2: 0.0, 0.404 2020 U2: 0.0, 0.35	No change across years in knowing about CQL
FUTURE_INTEREST_Q10B - How interested are you in participating in the following programs in the future?: CQL	0.7211	5138	0.325304	-0.1488	t = -0.4539	0.743353	0.2123	t = 0.6554	2019 All: 1.0, 1.275 2019 Not U2: 1.0, 1.267 2019 U2: 1.0, 1.286	2020 All: 1.0, 1.318 2020 Not U2: 2.0, 1.425 2020 U2: 1.0, 1.238	No change in interest in CQL by year or by U2 status
FUTURE_INTEREST_Q11A - Have you heard of URAP?	0.282	36507	0.51121	0.1401	z = 0.657	0.09028	0.355	z = 1.694	2019 All: 0.0, 0.3877 2019 Not U2: 0.0, 0.35 2019 U2: 0.0, 0.4588	2020 All: 0.0, 0.4332 2020 Not U2: 1.0, 0.5051 2020 U2: 0.0, 0.4333	No change across years in knowing about URAP
FUTURE_INTEREST_Q11B - How interested are you in participating in the following programs in the future?: URAP	0.1589	7063.5	0.52877	0.02246	t = 0.07229	0.279859	-0.17731	t = -0.58447	2019 All: 2.0, 1.443 2019 Not U2: 2.0, 1.449 2019 U2: 2.0, 1.436	2020 All: 1.0, 1.322 2020 Not U2: 1.5, 1.38 2020 U2: 1.5, 1.385	No change in interest in URAP by year or by U2 status

\*This question was 2020 only. Comparison made between U2 status rather by year.

**Table S6.** Student Survey *Qualitative Coding Manual part 1: students' perceived benefits of GEMS.*

Code Level 1	Code Level 2	Description	Examples
<b>Benefits</b>	<b>Gained knowledge/ interest</b>	Used when students gained information, interest in STEM education, or noted exposure to new topics. This can range from specific to vague, as well as new, re-viewed, or reinvigorating knowledge/ interest; This also codes for their perspective on the activities they did.	“GEMS contributed to my interest in STEM.”- 2020 “I loved the experience and want to it more.”- 2020 “Gems has helped me with my science classes.”- 2019 “See other areas of science I have not been exposed to.”- 2019
	<b>Real-world applicability / Gained or new perspectives</b>	Used when students reported relating learned content to real world issues or attributing learned content to a broadened perspective of real world issues.	“I gained a better understanding of how models can be used to represent and solve real-world issues.”- 2020 “It helped me learn about serious real-world problems.”- 2019
	<b>Program enjoyment and engagement</b>	Used when students reported feelings of enjoyment or engagement. This can include mentions of novelty or incentives.	“Finding enjoyment in participating in STEM driven activities.”- 2019 “Keep my busy throughout the day” - 2019 “Helped me exercise my brain muscles during the summer” - 2019 “Engaging project where you can explore some aspect of STEM that interest you” - 2019 “I got to experience an awesome opportunity at Walter Reed” - 2019 “First time I was in a formal lab setting” - 2019 “I got to experience new things” - 2019 “Did activities I couldn’t have done otherwise” - 2019
	<b>STEM careers</b>	Used when students specifically mention learning about STEM careers. This can include exposing them to new careers they’ve never heard about, or learning more about careers they were aware of.	“Provided examples of different jobs in the STEM field “- 2020 “I discovered new jobs in the STEM area”- 2020 “I am more aware of Stem careers.”- 2019 “Helped educate me about careers I might be interested in.”- 2019
	<b>Future plans</b>	Used when students discuss how GEMS added to their future plans. This can include next year science courses, colleges and college classes, and careers. This can be specific or vague.	“Learned about more STEM majors”- 2020 “I am interested in taking additional STEM classes at school.”- 2020 “It was a good experience to put down on academic resume.”- 2020 “I learned more about the career fields in STEM that I could possibly pursue.”- 2019 “Helped me think about future careers.”- 2019 “I know I want to be an engineer and I need to explore my options so it helped”- 2019
	<b>Meeting people</b>	Used when students mention meeting people. This can be other peers, mentors, or guest speakers. This also codes for creating friendships or new connections.	“I enjoyed talking with people that had the same interests as me”- 2020 “Met new friends” -2020 “I made friends.”- 2019 “Exposed me to a bunch of different types of people”- 2019 “Allowed me to make more connections with people.”- 2019
	<b>Personal growth</b>	Used when students spoke to their personal gain. This includes confidence, self- efficacy, soft skills, and other non-science practice skills.	“GEMS has helped me become more confident with my abilities in the STEM field.”- 2020 “Showed the importance of trying new things”- 2020 “Work with others and communicate”- 2020 “Learned how to work with others to get a job done.”- 2019 “GEMS taught me that I could be a good leader.”- 2019 “Learned to think more creatively.”- 2019
	<b>Mentorship</b>	Used when students specifically spoke about their relationship with their mentors. This can include how they were impacted by the mentorship.	“Able to talk to college students in STEM majors and STEM [professionals].”- 2020 “I enjoyed talking to the GEMS mentors because they were really informative and fun.”- 2020 “Amazing mentors that [truly] cared about us.”- 2019 “I learned how these mentors use their knowledge in the real life world.”- 2019
	<b>GEMS affiliates</b>	Used when students mention other affiliates of the GEMS program. This includes GEMS, as well as other AEOP programs, DoD careers, and military associations.	“Greater appreciation for the department of defense”- 2020 “It has helped me learn more about Gems.”- 2020 “Helped me learned more about careers at WRAIR.”- 2019 “GEMS has helped me to learn about different AEOP programs.”- 2019 “GEMS increased my knowledge on science related careers within the Army.”- 2019

**Table S7.** Student Survey Qualitative Coding Manual part 2: students' suggestions for improving GEMS.

Code Level 1	Code Level 2	Description	Examples
<b>Improvements</b>	<b>In-person</b>	Used when students mentioned that they wish eGEMS was in person. This code was only used in 2020.	<p>“This was out of anyone's control but GEMS will be better in-person”</p> <p>“Not be virtual”</p> <p>“I've never done GEMS in person, but I want to do that too”</p> <p>“I miss going into the lab though but I can't do that because of COVID-19”</p>
	<b>Satisfaction</b>	Used when students expressed satisfaction. This includes students who additionally provided improvements.	<p>“I don't have any improvements”- 2020</p> <p>“Not really sure. It was pretty solid and I can't find anything specific to change.”- 2020</p> <p>“It was really good and I don't know any way you could make it better.”-2020</p> <p>“None, I enjoyed it!”- 2019</p> <p>“I like it how it is.”- 2019</p> <p>“I loved all the things about this program.”- 2019</p>
	<b>Program logistics</b>	Used when students mentioned improving program logistics. This can include improvements that can be changed and improvements out of our control. This ranges from scheduling, stipends, supplies, and location.	<p>“Make sure all students have materials, because my bag didn't have it.”- 2020</p> <p>“More money”- 2020</p> <p>“It should start around 10, 9 is too early”- 2020</p> <p>“Have another building be it gets very crunched.”- 2019</p> <p>“Provide, snacks, breakfast, lunch.”- 2019</p> <p>“This survey is way too long.”- 2019</p>
	<b>Future plans</b>	Used when students wished to have gained more insight on college and careers. This can include more information about STEM fields, colleges, and career options.	<p>“More information about possible STEM/DoD careers would be helpful because there wasn't info on it.”- 2020</p> <p>“talk more about what to study in college for certain careers”- 2020</p> <p>“Talk more about how to get into good colleges”- 2020</p> <p>“Help us explore career options.”- 2019</p> <p>“More projects that delve into less explored stem branches.”- 2019</p> <p>“More about college and career.”- 2019</p>
	<b>Training</b>	Used when students described something that could be fixed with more training. This can include the way lessons were delivered and guidance on classroom management.	<p>“Involve everyone in the discussions.”- 2020</p> <p>“Give more guidance on what we have to do during experiments”- 2020</p> <p>“Connect everything to the real world”- 2020</p> <p>“When we learned about evolution, it made me uncomfortable.”- 2019</p> <p>“Sometime's people like working alone so make the person decide for themselves.”- 2019</p> <p>“Improve on helping students with their weaknesses in science.”- 2019</p>
	<b>Content</b>	Used when students commented on the content they were receiving. This can include content activities, complexity, and different topics.	<p>“Introduce different topics that aren't talked about in school”- 2020</p> <p>“Varying activities more from previous years”- 2020</p> <p>“Focus on each part of S.T.E.M equally because we spent a scarce amount of time on math.”- 2020</p> <p>“Have more activities outside.”- 2019</p> <p>“More challenging experiments for rising juniors and seniors.”- 2019</p>
	<b>Mentorship</b>	Used when students wanted more out of the mentors. This can include more time spent with them, interacting with other mentors, or wanting more out of the mentors.	<p>“More opportunities to work for a longer time with mentors and build relationships would be fun.”- 2020</p> <p>“most of the mentors should be more interactive”- 2020</p> <p>“Give more advice about college future.”- 2020</p> <p>“Maybe be able to have some private time with a near peer mentor to talk to him/her.”- 2019</p> <p>“Some instructors were a little boring.”- 2019</p> <p>“Learn more from the mentors. Get a time for Q&amp;A.”- 2019</p>
	<b>Engagement with GEMS affiliates</b>	Used when students mention other affiliates of the GEMS program. This includes GEMS, as well as other AEOP programs, DoD careers, and military associations.	<p>“Explain the Army thing and Department of Defense involvement in this.”- 2020</p> <p>“Offer more education on careers in the army and DoD”- 2020</p> <p>“Have more talks with others about other programs.”- 2020</p> <p>“Advertise more types [of] GEMS and AEOP Programs.”- 2019</p> <p>“Less pro-war and/or nationalist propaganda.”- 2019</p>
	<b>Professional Engagement</b>	Used when students mention a desire to engage more with professionals or visit professionals where they work such as in their labs or offices.	<p>“Meet real scientists”- 2020</p> <p>“Include speakers in virtual GEMS”- 2020</p> <p>“Have us meet/work with more employees of WRAIR.”- 2019</p> <p>“More communication with real time lab workers.”- 2019</p> <p>“Allow us to talk to more people with careers in stem.”- 2019</p> <p>“Providing more tours of labs.”- 2019</p>



**Table S8.** *Near-Peer Mentor Qualitative Coding Manual.*

Code Level 1	Code Level 2	Code Level 3	Description	Examples
Near-Peer Mentor Maturation	(no subcode)	(no sub code)	This overarching theme can be defined as ways in which near peer mentors reported developing as professionals, teachers, and scientists. This theme also includes near peer mentors personal development in the areas of self-confidence and self-efficacy.	“Yes”
	Professional development (PD)	(no sub code)	This theme includes the ways in which near peer mentors discussed increases in their professional skills and competencies and exploration of their own professional growth due to their participation in the GEMS program.	N/A
		Career Aspirations and Development & Planning	This code includes ways in which near peer mentors’ participation in GEMS directly impacted their career path as well as near peer mentors continued exploration of their scientific careers while they participated in the program. NPMS write about developing their future careers.	“It’s helped... grant me a better perspective of what I want to do in the future.”
		Networking	This code includes NPM discussion of how their participation in GEMS connected them with other scientists, professionals, and colleagues in the field, as well as using the skill of networking into the future.	“I’ve learned transferable skills I know I can take anywhere.”
		Enhanced employability	This code discusses ways in which NPMs participation in the program made them better candidates for future jobs in STEM and other fields or for application to graduate school programs.	“ The experience has allowed me to make many personal and professional connections that I will always carry with me.”
		Professional/ Transferable skills	NPMs describe learning professional and other skills that are transferable to any career path.	“ I learned how to communicate thoughts and directions clearly.”
		Gains in STEM knowledge and practice	This code includes ways in which NPMs report increased knowledge of scientific content and practice through their participation in the GEMS program. This code includes the subcodes knowledge, practice, lab culture, and lab safety.	“I think my confidence in breaking something down and explaining it definitely increased, which is a skill that will also help me in interviews ...”
		Communication skills	This code can be defined as increased oral and written language abilities as reported by near peer mentors through their participation.	“ I think that I learned more about each material each time I taught it; there were different questions I’d answer or realizations that I would have. “
	Teaching skills and experience (TS&E)	(no sub code)	This code includes ways in which near peer mentors report gaining experience specifically in the field of teaching through their participation in GEMS. This code includes the subcodes teaching strategies, working with diverse students, flexibility, instructional design, and communication.	N/A
		Teaching strategies/ skills	NPMs report gains in their knowledge and experience with teaching strategies/approaches to teaching while working with students. This code also includes classroom management strategies. This code focuses on the interaction between NPM and student.	“I learned a lot of teaching skills and that is what I want to to for rest of my life.”
		Working with diverse students	NPMs discuss their experiences working with students of different ages, backgrounds, and abilities.	“Teaching the same lessons to different age groups has really helped my communication skills.”
		Flexibility	NPMs discuss developing their ability to think on their feet, be flexible, and adjust their approaches in a fast changing environment.	“ I adjusted the concepts, language, and examples within my lessons as the Summer progressed to help cater to each age group’s needs.”
		Instructional design	NPM positive or negative reflections on the experience of developing science modules and one week schedules that scaffold a mini-curriculum. This code also includes NPM reflections on how successful their lessons were delivered and the quantitative and qualitative outcomes of their lessons. This code focuses on the preparation, planning and reflection element of developing lessons rather than the delivery of lessons and interaction with students.	“Well to start off I made a lesson plan, something I never thought I would do.”
	Self-efficacy and confidence (SE&C)	(no sub code)	This code includes ways in which NPMs explicitly report personal development in the areas of confidence and self-efficacy. This code includes communication skills, teaching skills, lab skills, professional skills, and career planning.	N/A
		Communication	NPMs report increased confidence in their ability to communicate through presentations orally and in written format to various groups.	“I feel much more confident in my ability to communicate with others clearly and effectively.”
		Teaching	NPMs reported increased confidence/self-efficacy in their teaching abilities.	“I remember the time I taught my first module, I was so nervous that I could not hear myself speaking. So, things did not go as I had planned. But, having to teach that same module repeatedly helped me to improve overtime. “
		Personal Growth	When an NPM discusses personal growth.	“My experiences as a near-peer mentor has pushed me out of my comfort zone a few times and forced me to grow as a result.”
	Relationships	(no sub code)	Beneficial comments on the nature of the relationship build from one NPM to another and with other staff and people in general.	“I think I’ve become more open and I have an easier time connecting with others. “
	Broadened Perspectives	(no sub code)	NPMs describe an experience in the program that changed the way they viewed something.	I’m so glad I learned about networking now because I had never really considered it before my time with GEMS. “