

Benefits of STEM Research Competitions

- Opportunities for students to exhibit their skills as scientists
- Engage in scientific practices
- Share their work with peers and other stakeholders across larger networks
- Aligns well with standards
- Acculturates students to challenging academic contexts
- Adaptable to the needs and interests of particular communities

Opportunities from Doing STEM Research

STEM Research Projects Often Lead To:

- Participation in science fairs and other research competitions at which scholarship/awards are given
- Increased chances of getting into college and succeeding once there
- Becoming a highly-skilled worker and obtaining satisfying, well-paying jobs
- Internship opportunities with organizations/ companies
- Mentorship with peers on science research

Aligning Science Fair With NGSS and CCSS

Four Phases of a STEM Competition Life Cycle:

- Preparation, Production , Presentation & Reflection

8 Practices of Next Generation Science Standards and Essential Science and Engineering Practices (SEPs):

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

ELA CCSS Alignment

Completing inquiry-based STEM research projects helps students practice these fundamental skills from the ELA CCSS:

- Building knowledge through complex, content-rich nonfiction text
- Reading, writing, and speaking grounded in evidence from the text
- Increasing academic vocabulary that extends across reading, writing, speaking & listening
- Utilizing critical reading strategies to comprehend scientific literature (print/online)
- Discussing/collaborating with others
- Communicating findings in written/oral reports

Crosscutting Practices with ELA CCS and NGSS:

- Asking questions and defining problems
- Constructing explanations and designing solutions
- Engaging arguments from evidence

List of Academic Words Typically Encountered in Preparation for Research Competition

Done: View

abbreviate*	define	format	method	publish	technique
abstract	degree*	framework	model*	qualitative*	technology
accuracy*	demonstrate	frequency*	monitor	quantitative*	testable*
affect*	determine*	hypothesis*	objective*	range	thesis
analyze	develop*	identify*	outcome	rate*	topic
bias	deviate	illustrate	pace*	ratio*	trial*
brief	device*	image	paradigm	reaction*	unit*

capacity*	diagram*	incidence	parameter	relationship*	variable*
chart	displacement*	inference*	pattern*	represent*	visual
claim*	display	initial*	per*	require	volume*
compare*	distance*	innovate	percent	research	weigh
conclude	document	input	phenomenon	resource	
conduct*	draft	instruct	plausible*	result*	
confirm	duration	interpret*	precision*	scale*	
conflict	empirical	Interval	predict	sequence	
consent	equivalent	investigate*	presume	significant	
context	error	isolate	principal	simulate*	
contradict	estimate	justify	principle	speed*	
contrast*	evaluate	label	prior	standard*	
controlling*	evidence*	length*	procedure*	statistic	
convert*	evident	link	process*	substance*	
correlate*	exhibit	mass*	professional	summary	
criteria	expert	mechanism	project	survey	
data	factor*	media	protocol	system*	
deduce	fair*	meter*		task	
			publication		

*= Focus Words in NGSS

Adapted from Science

Generation <https://serpmedia.org/scigen/dashboard.html> ©2018 SERP Institute

Math CCSS Alignment

Completing inquiry-based STEM research projects helps students practice these fundamental skills from the Math CCSS:

- Strong foundations of a high degree of procedural skills and fluency
- Solve complex problems locally, regionally, nationally and globally
- Apply mathematical skills to solve problems Apply rigorous, deep, authentic command of mathematical concepts
- See math as more than a set of mnemonics or discrete procedures
- Applying mathematic knowledge while looking for solutions

Crosscutting Practices with Math CCS & NGSS:

- Using mathematics and computational thinking
- Analyzing and interpreting data
- Developing and using models

Improving Science Education Through 3-Dimensional Learning

- Increased expertise in techniques and specific lab and field skills
- Interests unique to their STEM journey for college/career planning
- Strengthening relevance of STEM to everyday life
- Embrace inquiry and hands-on way of learning
- Open their minds to new ways of thinking in learning and discovery
- Becoming resourceful while looking for solutions
- Dealing with setbacks and necessary repetitions