

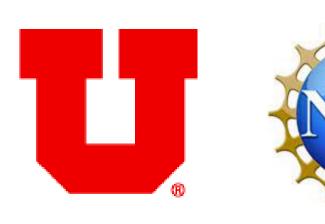
Research Questions

(1) What science investigation and engineering design features are present in a solutioning curriculum program? (2) When implementing a curricular program with science investigation and engineering design features, what evidence of interest and motivation are present?

Solutioning Instructional Model							
Engage	Students ask questions associated with an introductory activity (often local environmental issues).						
Explore	Students collect data to use as evidence						
Explain	Students use evidence from the Explore phase to construct arguments to address their scientific questions.						
Engineer	Students design a solution and a plan that meets specific design criteria and constraints. Students test their solutions through feedback and data collection to determine if their solution is optimal for addressing the problem.						
Educate	Students synthesize key ideas from their designs to inform and educate local stakeholders about possible implementation.						

Usable STEM Knowledge: Fostering motivation and interest in STEM learning

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	Unit 1							Unit 2				Unit 3						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Providing Choice or Autonomy													I	Ε	Ε	I	Ε	Ε
Promoting Personal Relevance	Ε	Ε		Ε	Ε								Ε				Ε	I
Presenting Appropriately Challenging Material																Ε		I
Situating the Investigations Socially and Culturally													Ε	Ε	Ε	Ε	Ε	Ε

Design Feature						
Providing Choice or Autonomy	"Maybe we could pu the sides and then c in" - Student 1					
Promoting Personal Relevance	"I think they're more something they could visualize doing it in o real. This is tangible,' excited." - Teacher A					
Presenting Appropriately Challenging Material	"I don't think a Box Student 2 "Oh, let's cut a bigg					



Quotes

it the green sticks on top instead of ut a hole in the top to let the insects

excited with this because it was ld actually do, and they could kind of our schoolyard... They're like, 'This is ,' so I felt like they were quite

lder Bug can fit through that hole." -

er hole in the middle." - Student 3

least one of the design features, and 16 lessons included at least one design feature. • After experiencing the program, more than 60% of all students scored high (4 or 5) on all four science and engineering meaningfulness and interest survey items (N=134). • During interviews, teachers and students expressed evidence of autonomy, personal relevance, and appropriate challenge - design features associated with interest and motivation.



Results

• Ten lessons strongly emphasized at

