ROBBINSVILLE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

DEPARTMENT

Grade 6 Technology

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BOARD OF EDUCATION INITIAL ADOPTION DATE: September, 2017

Course Philosophy

The Technology program focuses on every individual developing technology problem solving skills, technological literacy, and 21st century skills through hands-on activities integrating Science, Technology, Engineering, and Mathematics (STEM). The Technology education program is dedicated in providing experiences that prepare students to be successful in their transition through secondary education and into post secondary careers. Teaching technological literacy, will help students develop the skills necessary to be lifelong learners and successfully contribute and function in a technological society.

Course Description

In 6th grade, Technology is an activity based course that introduces students to technology by exploring systems of technology, design, and engineering through three dimensional prototyping and developing systems to solve problems. Using an integrated Science, Technology, Engineering, and Mathematics (STEM) approach to instruction; students will study and apply technological problem solving method, engineering design process, 21st century skills, graphic design and communication, knowledge of energy transfer, physical laws of motion, and structural engineering. Students will have a variety of projects and activities in the design and engineering technology lab related to three dimensional prototyping technology and designing systems to problem solve. Students will work in teams and individually to complete required classroom and lab assignments.

Robbinsville Public Schools

Curriculum Map

(This is a worksheet intended to support the development of the overall document. It should be submitted to the supervisors if appropriate but it will not be included in the final board-approved document)

6th Grade Technology-Three dimentional design and prototyping

Relevant Standards	Standards Unpacked Skill / Concept / Process?	Enduring Understandings / Unit Goals	Essential Questions	Unit Title / Suggested Timeline
Unit #1: Exploring 3D CAD & Prototyping NGSS: MS-ETS1-1: ETS1.A:	ELA/Literacy - RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ETS1-1)	 Computer Aided Design improves efficiency within the design loop 3D Printing is a process called additive manufacturing Additive manufacturing has pros and cons Learn a CAD program in order to 	 How can 3D CAD and 3D printing play a role in the advancement of technology and continue to improve human lives and the environment? How is CAD beneficial to the 	8 hours (8 class periods)
ELA/Literacy - RST.6-8.1. WHST.6-8.8 Mathematics - MP.2	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific	design and print an object	 engineering design process? How do hardware and software work together? When designing in Tinkercad, why is it important to follow step-by-step directions carefully? 	
7.EE.3 Common Core	principles 8.2.8.A.5 Describe how		How does the process of 3D printing (additive manufacturing) affect the way	
Technology The characteristics and scope of	resources such as material, energy, information, time, tools, people, and capital contribute to a		we must think about our designs?	
technology. 8.2.8.A.1 8.2.8.A.2	technological product or system.			

8.2.8.A.3	8.2.8.B.2 Identify the		
0.2.011.0	desired and undesired		
The	consequences from the use		
relationships	of a product or system.		
among			
technologies	The attributes of design.		
and the	8.2.8.C.1 Explain how		
connections	different teams/groups		
between	can contribute to the		
technology and	overall design of a product.		
other fields of			
study.	The application of		
8.2.8.A.4	engineering design.		
8.2.8.A.5			
	8.2.8.C.4 Identify the		
The cultural,	steps in the design process		
social,economic	that would be used to		
and political	solve a designated		
effects of	problem.		
technology.			
8.2.8.B.1	8.2.8.C.5.a Create a		
8.2.8.B.2	technical sketch of a		
8.2.8.B.3	product with materials and		
8.2.8.B.4	measurements labeled.		
The role of	8.2.8.C.8 Develop a		
society in the	proposal for a chosen		
development	solution that include		
and use of	models (physical,		
technology.	graphical or		
8.2.8.B.5	mathematical) to		
	communicate the solution		
The attributes	to peers.		
of design.			
8.2.8.C.1	Apply the design		
8.2.8.C.2	process.		
8.2.8.C.3	8.2.8.D.1 Design and		
	create a product that		

The application	addresses a real world		
of engineering	problem using a design		
design.	process under specific		
8.2.8.C.4	constraints.		
8.2.8.C.5.a			
	8.2.8.D.2 Identify the		
The role of	design constraints and		
troubleshooting	trade-offs involved in		
research and	designing a prototype		
development,	(e.g.,		
invention and	how the prototype might		
innovation and	fail and how it might be		
experimentatio	improved) by completing		
n in problem	a design problem and		
solving.	reporting results in a		
8.2.8.C.6	multimedia presentation,		
8.2.8.C.7	design portfolio or		
8.2.8.C.8	engineering notebook.		
Apply the			
design process	8.2.8.D.3 Build a		
8.2.8.D.1	prototype that meets a		
8.2.8.D.2	STEM-based design		
8.2.8.D.3	challenge using science,		
	engineering, and math		
Use and	principles that validate a		
maintain	solution.		
technological			
products and			
systems.			
8.2.8.D.4			
A			
Assess the			
impact of			
products and			
systems.			
8.2.8.D.5			
8.2.8.D.6			

Unit #2:	ELA/Literacy -	Using 3D CAD and 3D printing,	How can three dimensional	12 hours (12 class
3D Prototype STEM	RST.6-8.1 Cite	follow the design loop to create a	(3D) printing play a role in	periods)
Design Challenge	specific textual evidence	part that is integral to a larger	the advancement of	
NGSS:	to support analysis of science and technical	systemWork as part of a team to create a	technology and continue to improve human lives and the	
MS-ETS1-1:	texts. (MS-ETS1-1)	product, taking on specific roles	environment?	
ETS1.A:	texts. (WIS-12131-1)	within the group	How is 3D printing a useful	
	MS-ETS1-1. Define	Draft and defend a proposal for	resource when designing a	
ELA/Literacy -	the criteria and constraints	the product the group plans to	new product?	
RST.6-8.1.	of a design problem with	make	How does working in a team	
WHST.6-8.8	sufficient precision to		affect the over design and	
	ensure a successful		production of a product?	
Mathematics -	solution, taking into			
MP.2	account relevant scientific			
7.EE.3	principles			
Common Core	8.2.8.A.5 Describe how			
Technology	resources such as material,			
The	energy, information, time,			
characteristics	tools, people, and			
and scope of	capital contribute to a			
technology. 8.2.8.A.1	technological product or			
8.2.8.A.2	system.			
8.2.8.A.3	8.2.8.B.2 Identify the			
0.2.0.110	desired and undesired			
The	consequences from the use			
relationships	of a product or system.			
among				
technologies	The attributes of design.			
and the	8.2.8.C.1 Explain how			
connections	different teams/groups			
between				

technology and	can contribute to the	
other fields of	overall design of a product.	
study.	overall design of a product.	
8.2.8.A.4	The application of	
8.2.8.A.5	engineering design.	
0.2.0.11.5	engineering design.	
The cultural,	8.2.8.C.4 Identify the	
social,economic	steps in the design process	
and political	that would be used to	
effects of	solve a designated	
technology.	problem.	
8.2.8.B.1		
8.2.8.B.2	8.2.8.C.5.a Create a	
8.2.8.B.3	technical sketch of a	
8.2.8.B.4	product with materials and	
	measurements labeled.	
The role of		
society in the	8.2.8.C.8 Develop a	
development	proposal for a chosen	
and use of	solution that include	
technology.	models (physical,	
8.2.8.B.5	graphical or	
	mathematical) to	
The attributes	communicate the solution	
of design.	to peers.	
8.2.8.C.1		
8.2.8.C.2	Apply the design	
8.2.8.C.3	process.	
	8.2.8.D.1 Design and	
The application	create a product that	
of engineering	addresses a real world	
design.	problem using a design	
8.2.8.C.4	process under specific	
8.2.8.C.5.a	constraints.	
The role of	8.2.8.D.2 Identify the	
troubleshooting	design constraints and	
research and	trade-offs involved in	

development,	designing a prototype		
invention and			
innovation and	(e.g.,		
	how the prototype might		
experimentatio	fail and how it might be		
n in problem	improved) by completing		
solving.	a design problem and		
8.2.8.C.6	reporting results in a		
8.2.8.C.7	multimedia presentation,		
8.2.8.C.8	design portfolio or		
	engineering notebook.		
Apply the			
design process			
8.2.8.D.1	8.2.8.D.3 Build a		
8.2.8.D.2	prototype that meets a		
8.2.8.D.3	STEM-based design		
	challenge using science,		
Use and	engineering, and math		
maintain	principles that validate a		
technological	solution.		
products and			
systems.			
8.2.8.D.4			
Assess the			
impact of			
products and			
systems.			
8.2.8.D.5			
8.2.8.D.6			
0.2.0.1.0			

Robbinsville Public Schools Scope, Sequence, and Assessment

Technology, Grade 6

		Recommended	Assessments				
Unit Title	Unit Understandings and Goals	Duration	Diagnostic (before)	Formative (during)	Summative (after)		
Exploring 3D CAD & Prototyping	 Computer Aided Design improves efficiency within the design loop 3D Printing is a process called additive manufacturing Additive manufacturing has pros and cons Learn a CAD program in order to design and print an object 	8 hours	Class discussion to see guage understanding of CAD and 3D printing	 WebQuests Class discussions Project planning evaluation and revision (teacher check) Project journal (Peer, Self, and Teacher check given with feedback) 1:1 teacher meetings Checks for understanding-exit tickets Peer check of collaboration skills and accountability using rubric Self assessment of collaboration skills and accountability using a rubric 	Performance based assessments (testing of the product and evaluating the products ability to meet goal of design challenges.) Ex: CAD Portfolio & Independent Design Poject (Group and individual) presentation of product(s) from design challenge		

3D Prototype	 Using 3D CAD and 3D printing, follow the design 	12 hours	How could you	•	Teacher	Inquiry based,
STEM Design	loop to create a part that is integral to a larger system		use 3D		conferences	STEM Design
Challenge	Work as part of a team to create a product, taking on		printing in	•	Project proposal	Challenge(s) that
Chancinge	specific roles within the group		your life to	•	Class discussions	follows the design
	 Draft and defend a proposal for the product the 		solve a real	•	Exit tickets	loop and
	group plans to make		problem?	•	Peer check of	incorporates a 3D
	9 - 1 1		Turn & Talk		collaboration	printed part
			Share out		skills and	integral to the
			5		accountability	project's success
					using rubric	& write up
				•	Project planning	55 W = 555 MP
					evaluation and	 Performance
					revision (teacher	based
					check)	assessments
				•	Project journal ((testing of the
					Peer, Self, and	product and
					Teacher check	evaluating the
					given with	products ability
					feedback)	to meet goal of
				•	Self assessment	design
					of collaboration	challenges.)
					skills and	chancinges.)
					accountability	• (Group and
					using a rubric	individual)
					donig a rubite	presentation of
						product(s)
						from design
						challenge
						Chancinge

Robbinsville Public Schools

Unit #1: Exploring 3D CAD & Prototyping

Enduring Understandings:

- 3D CAD and printing will continue to have a greater impact on society in many different fields.
- Hardware and software work together control a variety of devices that are used complete specific tasks.

Essential Questions:

- How can 3D CAD and 3D printing play a role in the advancement of technology and continue to improve human lives and the environment?
- How is CAD beneficial to the engineering design process?
- How do hardware and software work together?
- When designing in Tinkercad, why is it important to follow step-by-step directions carefully?
- How does the process of 3D printing (additive manufacturing) affect the way we must think about our designs?

_	pical Questions fic Standards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
NGSS: MS-ETS1-1:	What is the relationship	Computer Aided Design improves efficiency within the design loop	Mini lesson/lectureProject based learning	Internet resouces	Formative: • Check for
ETS1.A:	between hardware	 3D Printing is a process called additive manufacturing 	Cooperative LearningHands-On Activities	• Content Resource	understanding questions will be
ELA/Liter acy -	and software?	Additive manufacturing has pros and cons	 Input/Output stations Independent work	manuals	utilized during large group
RST.6-8.1. WHST.6-8.	How does	Learn a CAD program in order to design and print an object	Socratic SeminarSTEM design challenge	Tech Lab tools and materials	instruction.
8	the 3D printing		projects Class discussion	(wood cutters, hot glue, scissors,	Exit tickets
Mathemati	process,		Large Group DemosSmall Group Instruction	tape, calculators, safety	Temperature guages
MP.2	manufacturin g, shape the		 Individualized Instruction Multimedia Presentations 	equipment)	Students will be
7.EE.3	way we use 3D CAD to		Interactive Comp. SoftwareWebquests	PowerPoint Presentation	asked open ended questions
Common	create		Journal Writing		during small
Core	prototypes?			Google software	group and
Technolog y				suit	individualized instruction to
				 Design Software 	

The			check for
characterist		 MS Software 	understanding
ics and			
scope of		 Tech Lab 	 Students will
technology.		Equipments and	complete
8.2.8.A.1		Design Tools	Project journals
8.2.8.A.2		 3D printers 	that will be
8.2.8.A.3		 CO₂ Laser 	reviewed for
		 Band saw 	accountability
The			and
relationshi			understanding.
ps among			
technologie			 Students will
s and the			complete
connection			Self-evaluation/
s between			reflection rubric
technology			after group and
and other			independent
fields of			work.
study.			
8.2.8.A.4			Summative:
8.2.8.A.5			 Quizzes/Tests
			 Inquiry based,
The			problem based
cultural,			projects and
social,econ			investigations.
omic and			 Performance
political			based
effects of			assessments-
technology.			results of
8.2.8.B.1			investigation or
8.2.8.B.2			design challenge
8.2.8.B.3			 Accountability
8.2.8.B.4			assessment of
			self directed
The role of			learning. (
society in			assessed
the			through rubric)

developme				
nt and use				
of				
technology.				
8.2.8.B.5				
The				
attributes				
of design.				
8.2.8.C.1				
8.2.8.C.2				
8.2.8.C.3				
The				
application				
of				
engineerin				
g design.				
8.2.8.C.4				
8.2.8.C.5.a				
The role of				
troublesho				
oting,resea				
rch and				
developme				
nt,				
invention and				
innovation				
and				
experiment				
ation in				
problem				
solving.				
8.2.8.C.6				
8.2.8.C.7				
8.2.8.C.8				
	i e	•		

Apply the			
design			
process			
8.2.8.D.1			
8.2.8.D.2			
8.2.8.D.3			
0.2.0.3			
Use and			
maintain			
technologic			
al products			
and			
systems.			
8.2.8.D.4			
Assess the			
impact of			
products			
and			
systems.			
8.2.8.D.5			
8.2.8.D.6			

Robbinsville Public Schools

Unit #2: 3D Prototype STEM Design Challenge

Enduring Understandings:

- Three dimensional (3D) CAD and printing will continue to have a greater impact on society in many different fields.
- Hardware and software work together control a variety of devices that are used complete specific tasks.

Essential Questions

- How can three dimensional (3D) printing play a role in the advancement of technology and continue to improve human lives and the environment?
- How is 3D printing a useful resource when designing a new product?
- How does working in a team affect the over design and production of a product?

ndards	Content, Themes, Concepts, and Skills	Teaching Strategies	Instructional Resources and Materials	Assessment Strategies
What must	Using 3D CAD and 3D printing,	Mini lesson/lecture	Internet resouces	Formative:
be	follow the design loop to create a	Cooperative Learning		 Check for
considered	part that is integral to a larger	 Project based learning 	• Content	understanding
when	system	Hands-On Activities	Resource	questions will be
designing an	• Work as part of a team to create a	 Input/Output stations 	manuals	utilized during
object to be	product, taking on specific roles	Independent work		large group
3D printed?	within the group	Socratic Seminar	 Tech Lab tools 	instruction.
	 Draft and defend a proposal for 	STEM design challenge	and materials (
How can a	the product the group plans to	projects	wood cutters, hot	 Exit tickets
system	make	Class discussion	glue, scissors,	
benefit from		 Large Group Demos 	tape, calculators,	 Temperature
the		Small Group Instruction	safety	guages
application		Individualized Instruction	equipment)	
of 3D		Multimedia Presentations	* * *	Students will be
printed		• Interactive Comp. Software	 PowerPoint 	asked open
parts?		 Webquests 	Presentation	ended questions
•		Journal Writing		during small
			Google software	group and
			suit	individualized
				instruction to
			Design Software	check for
				understanding
	be considered when designing an object to be 3D printed? How can a system benefit from the application of 3D printed	be considered when designing an object to be 3D printed? How can a system be follow the design loop to create a part that is integral to a larger system • Work as part of a team to create a product, taking on specific roles within the group • Draft and defend a proposal for the product the group plans to make benefit from the application of 3D printed	be considered part that is integral to a larger system designing an object to be 3D printed? How can a system benefit from the application of 3D printed? printed parts? follow the design loop to create a part that is integral to a larger system • Work as part of a team to create a product, taking on specific roles within the group • Draft and defend a proposal for the product the group plans to make • Cooperative Learning • Project based learning • Hands-On Activities • Input/Output stations • Socratic Seminar • STEM design challenge projects • Class discussion • Large Group Demos • Small Group Instruction • Individualized Instruction • Multimedia Presentations • Interactive Comp. Software • Webquests	What must be considered when designing an object to be 3D printed? How can a system benefit from the application of 3D printed parts? What must be follow the design loop to create a part that is integral to a larger system Draft and defend a proposal for the product the group plans to printed parts? ■ Using 3D CAD and 3D printing, follow the design loop to create a part that is integral to a larger system ■ Work as part of a team to create a product, taking on specific roles within the group ■ Draft and defend a proposal for the product the group plans to make ■ Cooperative Learning ■ Project based learning ■ Hands-On Activities ■ Independent work ■ Socratic Seminar ■ STEM design challenge projects ■ Class discussion ■ Large Group Demos ■ Small Group Instruction ■ Multimedia Presentations ■ Interactive Comp. Software ■ PowerPoint Presentation ■ PowerPoint Presentation ■ Google software

The		Tools and	Students will
relationships		Materials	complete
_		Student	Project journals
among		workstations MS	that will be
technologies			
and the		Software	reviewed for
connections			accountability
between		• Tech Lab	and
technology and		Equipments and	understanding.
other fields of		Design Tools	
study.		 3D printers 	 Students will
8.2.8.A.4		 CO₂ Laser 	complete
8.2.8.A.5		 Band saw 	Self-evaluation/
			reflection rubric
The cultural,			after group and
social,economi			independent
c and political			work.
effects of			
technology.			Summative:
8.2.8.B.1			 Quizzes/Tests
8.2.8.B.2			 Inquiry based,
8.2.8.B.3			problem based
8.2.8.B.4			projects and
			investigations.
The role of			Performance
society in the			based
development			assessments-
and use of			results of
technology.			investigation or
8.2.8.B.5			design challenge
<u></u>			Accountability
The attributes			assessment of
of design.			self directed
8.2.8.C.1			learning.
8.2.8.C.2			(assessed
8.2.8.C.3			through rubric)
0.2.0.0.3			unough rubiic)
The			
application of			
application of			

engineering			
design.			
8.2.8.C.4			
8.2.8.C.5.a			
The role of			
troubleshootin			
g,research and			
development,			
invention and			
innovation and			
experimentatio			
n in problem			
solving.			
8.2.8.C.6			
8.2.8.C.7			
8.2.8.C.8			
Apply the			
design process			
8.2.8.D.1			
8.2.8.D.2			
8.2.8.D.3			
Use and			
maintain			
technological			
products and			
systems.			
8.2.8.D.4			
Assess the			
impact of			
products and			
systems.			
8.2.8.D.5			
8.2.8.D.6			
0.2.0.12.0			