

From STEM to STEAM in Greenville County Schools

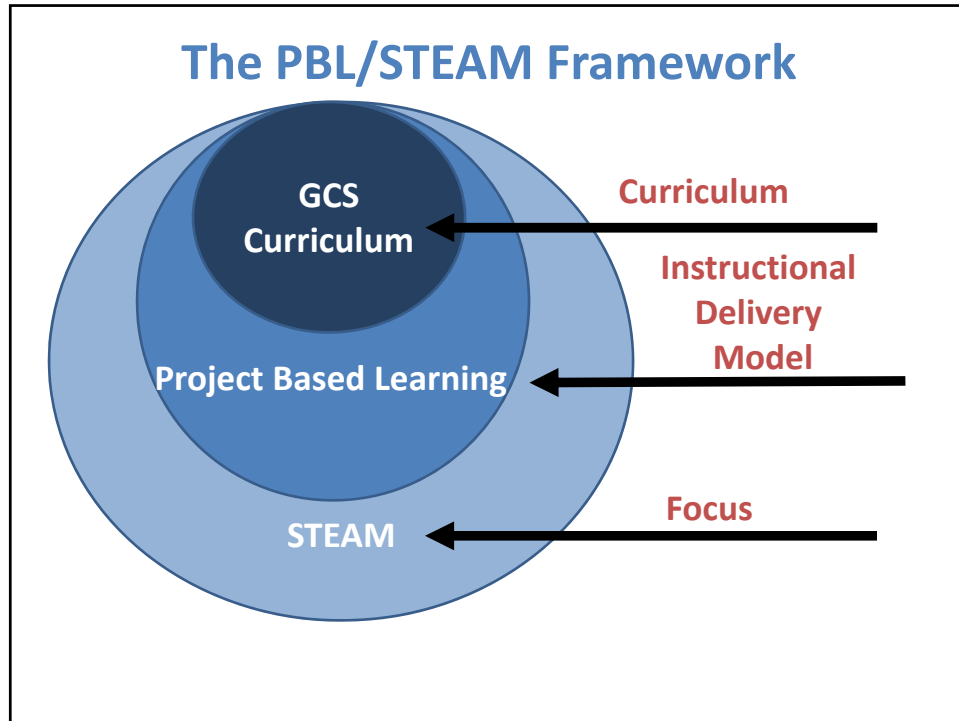


SCSBA Conference
February, 2016

STEAM Rising in GCS

- STEAM Framework
- PBL Essentials
- Innovation Station @Sevier Middle School
- Focus on Fisher Middle School
- Teacher Preparation and Support





STEAM Schools in GCS

Middle schools:

- Sevier
- Dr. Phinnize J. Fisher
- Hughes Academy



Elementary schools:

- AJ Whittenberg
- Summit Drive



Project Based Learning Essentials

Significant Content	Aligning to SC Curriculum Standards and building Enduring Understandings	A Need-to-Know	Creating an entry event that provides student relevance and authenticity to generate interest & curiosity
21st Century Proficiencies	Developing skills and competencies critical to the 21 st Century workplace	Student Voice & Choice	Guiding students through the process as teacher facilitators, but students have choice in products and tasks
Inquiry	Engaging students in a rigorous process of asking questions & developing answers	Critique and Revision	Giving and receiving feedback leading to deeper understanding and more inquiry
Driving Question	Focusing project work on an open ended question to drive the project	Public Audience	Presenting student work beyond the classroom walls (authenticity)

STEAM ALIVE Unit Design Rubric

Criteria:

- **Authenticity: real-world and relevant**
 - Meaningful problem or question
 - Audience for students' work beyond the classroom
- **Academic rigor: critical thinking**
 - well-defined driving question (EQ) that is derived from specific national and/or state standards
 - Depth and breadth of specific knowledge
 - Evidence of integration
- **Applied learning: creativity, collaboration, communication**
 - Realistic, complex problem solving
 - High-performance work skills
 - Incorporation of appropriate technology
 - Team-work
 - Communication of new learning to an intended audience
- **Assessment: frequent and timely**
 - Formative assessment practices throughout
 - Product production that demonstrates new learning, aligned with intended outcomes



STEAM @ Sevier: *Innovation Station*

Significant Content

- Aligning to SC Curriculum Standards
- Building Enduring Understandings

Enduring Understanding: Humans have a direct or indirect impact on their world by the inventions/innovations they design.

<p>ELA: Research informational and argumentative writing</p> <p>RI 7.1, 6, 8, 9</p> <p>W 7.1, 7, 8</p> <p>W 7.2</p> <p>SL 7.4, 5, 6</p>	<p>Math: Explore the need for accuracy and precision in measurements in order to produce scale drawings</p> <p>7G.A.2, 3, 5</p> <p>7G.B.4, 6</p> <p>7MP 1, 4, 5, 6</p>	<p>PE: Work cooperatively within a group to establish and achieve group goals in competitive as well as cooperative physical activity settings</p> <p>M 7.1, 4, 7</p> <p>N 7.6, 7, 8</p>	<p>Science: investigate the processes involved in engineering and technological design</p> <p>SI 7-1</p> <p>WHST 7.1</p>	<p>Social Studies: understand the far-reaching impact of the Industrial Revolution on the political, social and economic aspects of society—then and now</p> <p>SS 7-3.4</p> <p>RHST 7.4, 7</p> <p>WHST 7.2, 6</p>
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21st Century Proficiencies

Developing skills and competencies critical to the 21st Century workplace

Critical thinking	Creativity	Collaboration	Communication
<ul style="list-style-type: none"> • Research the impact of inventions • Explain the difference between an invention and an innovation • Produce an accurate scale drawing 	<ul style="list-style-type: none"> • Create a sales pitch for your design using argument strategies 	<ul style="list-style-type: none"> • Brainstorm a team idea of an invention or innovation that will have a positive impact on society 	<ul style="list-style-type: none"> • Pitch your design to a business team • Post marketing pitch to Edmodo • Critique and evaluate the team design and the designs of other teams

Engaging students in a rigorous process of asking questions and developing answers

Inquiry

1. Work collaboratively in teams of 2-3 students
2. Create an innovation of choice using the Engineering Design Process



Students work together in groups to research inventions that have impacted society.



7th Grade STEAM Innovation Stations – students are preparing for their meeting with the Sharks.

3. Present the innovation to the Shark Tank Panel
4. Re-evaluate your team design
5. Evaluate the designs posed by other teams

Driving Question(s)

Focusing project work on an open ended question to drive the project

Driving Question: **How can innovations impact society?**

English: What techniques can we use to market our innovation?

Math: How can we use scale and proportion to draw a schematic design?

PE: What kind of game, sport, or equipment could you invent that would have a positive impact on society?

Science: What is the design process and how can we use it?

Social Studies: How have inventions impacted society?

Creating an entry event that provides student relevance and authenticity to generate interest & curiosity in the project

A Need-to-Know

Innovation Team 7th Grade Assembly:

- Preview *Shark Tank* episode
- Explain overall project and integration of content areas
- Select make-up of teams



Student Voice & Choice

Guiding students through the process as teacher-facilitators, but students have choice in products and tasks

What career cluster are we interested in? (Circle one)

Agriculture, Food
& Natural
Resources

Architecture &
Construction

Arts, A/V
Technology &
Communications

Business
Management &
Administration

Education & Training

Educators Guide

Finance

Government & Public
Administration

Health Science

Hospitality &
Tourism

Human Services

Information
Technology (IT)

Law, Public
Safety,
Corrections &
Security

Manufacturing

Marketing

Science,
Technology,
Engineering &
Math

Transportation,
Distribution &
Logistics

What problem do we want to solve from this career cluster: _____

What inventions already exist to solve this problem?

Giving and receiving feedback leading to deeper understanding and more inquiry

Critique
and
Revision

STEAM SPORTS/GAME Rubric

Category	Proficient	Basic	Needs Improvement
Preparation And Collaboration	Student has attempted to work with everyone in group to decide a project; research of ideas	Student has attempted to work with at least one or two others to decide a project.	Student has not attempted to decide on a project or to work with anyone else
Creativity and Content OBJECT OF THE GAME/SPORT PURPOSE OF THE EQUIPMENT	Student has shown evidence of using the 8 steps to invent a sport/game. The project demonstrates original personal expression	Student has worked with the group to brainstorm and choose a name for the sport or game, some originality	Student shows little evidence or no evidence of using the steps to invent a sport/game. Lacks originality
Organization and Neatness of design/sketches	Student has shown evidence of choice, design, rules, space/place, needs	Student has shown evidence of choice and design	Student has shown no evidence of choice or design.

Rubrics were used at each phase of the project.

Public
Audience

Presenting student work beyond the classroom walls (authenticity)



Groups posted positive comments and suggestions to Edmodo. The top ten innovations, chosen by 7th grade teachers, were reviewed by volunteer "Sharks" from the local business community who selected the two most promising innovations.

Public
Audience

Presenting student work beyond the classroom walls (authenticity)



7th Grade STEAM Innovation Stations student teams met with local businesses professionals on the Shark Tank panel.

Public
Audience

Presenting student work beyond the classroom walls (authenticity)

Innovation Station

Fisher Middle School



Key Design Elements to Support the Instructional Focus

- Building designed as a learning tool, with Academics Division included on the planning team from the onset of the design process
- Planning team (facilities, project manager & Academic members) met with architectural firm to design the school around the curriculum
- Open spaces for maximum student collaboration
- Collaboration Room for teachers (no "assigned" classrooms for teachers)
- Differentiated learning spaces to accommodate Project-Based Learning & STEAM focus



Learning Spaces to Create 21st Century Proficiency

- Digital Storytelling Lab
- Piano Keyboarding and Composition Lab
- Innovation Lab
- Project/Prototype galleries



James D. MacConnell Award

WINNER

Dr. Phinnize J. Fisher Middle School

Greenville County Schools

Greenville, South Carolina

McMillan Pazdan Smith Architecture in

Association with

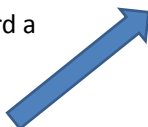
Co-Design Architect Fielding Nair

International

Teacher Preparation and Support

STEAM Expert Teacher Cohort Training (2 cohorts)

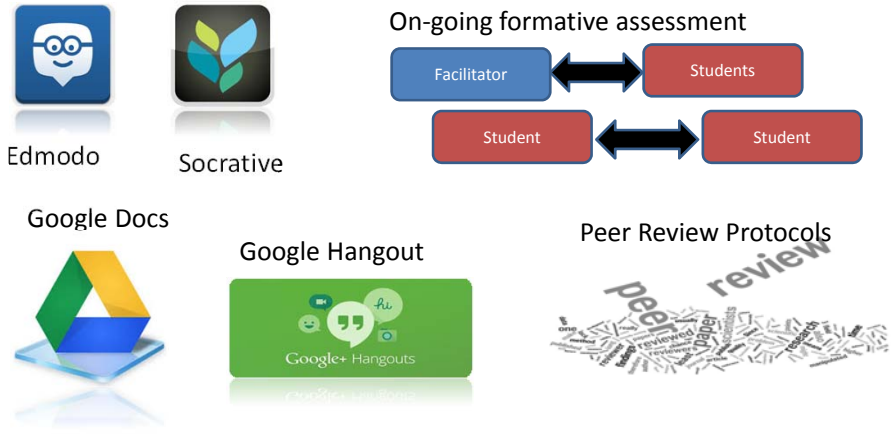
- ✓ Supported by grant funds from BOSCH Community fund
- ✓ Designed to promote sustainability for STEAM: Development of STEAM Teacher Leaders
- ✓ 44 teacher-participants representing 9 middle schools
- ✓ Participants completed three graduate courses through Clemson University (free to participants)
- ✓ Participants are working toward a STEAM endorsement (awaiting approval from CHE)
- ✓ Participants selected STEAM Teacher Leader Project:



Project Choice
Playful Learning Summit Conference at Roper Mountain Science Center
GCS Curriculum Writing Team
GCS Xplore Lead Instructor
GCS UTC Presenter
PD Presentation at Home School*
GCS PD Presentation*

Teacher Preparation and Support

Modeling Technology Integration and Best Practices





ALIVE Training

Entire Faculties:

- Sevier Middle School
- Dr. Phinnize J. Fisher Middle School
- Hughes Academy
- AJ Whittenberg School of Engineering
- Summit Drive Elementary School

Any interested teacher:

- STEAM ALIVE course

