Pedagogy of STEAM

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“Learners should understand that scientific knowledge is developed through a variety of approaches, and not one scientific method.” (Schwartz, 2007, p.43).

There are infinite ways to integrate the various skills of STEAM standards. So how do we find a way to unify practices while still allowing teacher discretion in lesson content selection? Implementation of STEAM within schools is a solution to develop skills for future professionals of twenty-first century education. Aligning the framework of research based practice with current classroom strategies is important to ensure equity in learning across buildings.

Pedagogy of STEAM and 21 Century Learning

Keeping focus on PLC and how we can move learners forward, it is important to: 1. understand essential learning and the standards associated with STEAM.

Science, Technology, Engineering, Art, and Math

S- Next Generation Science Standards and Evidence Statements

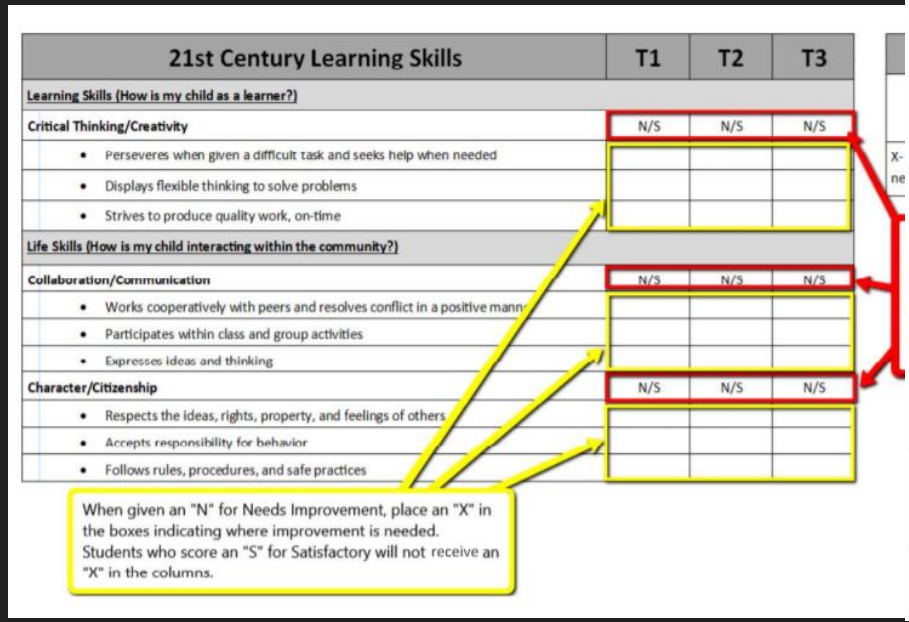
T- SD tech standards and STEL practices

E- NGSS Engineer Practices

A- application to CCSS, National Art standards.org and National Coalition for Core Art Standards

M- Next Generation Science Standards and Application to CCSS mathematics

RCAS report card and relationship to 5E framework



21st Century Learning Skills	T1	T2	T3
Learning Skills (How is my child as a learner?)			
Critical Thinking/Creativity	N/S	N/S	N/S
• Perseveres when given a difficult task and seeks help when needed			
• Displays flexible thinking to solve problems			
• Strives to produce quality work, on-time			
Life Skills (How is my child interacting within the community?)			
Collaboration/Communication	N/S	N/S	N/S
• Works cooperatively with peers and resolves conflict in a positive mann			
• Participates within class and group activities			
• Expresses ideas and thinking			
Character/Citizenship	N/S	N/S	N/S
• Respects the ideas, rights, property, and feelings of others			
• Accepts responsibility for behavior			
• Follows rules, procedures, and safe practices			

When given an "N" for Needs Improvement, place an "X" in the boxes indicating where improvement is needed. Students who score an "S" for Satisfactory will not receive an "X" in the columns.

Phase	Summary
Engagement	The teacher or a curriculum task accesses the learners' prior knowledge and helps them become engaged in a new concept through the use of short activities that promote curiosity and elicit prior knowledge. The activity should make connections between past and present learning experiences, expose prior conceptions, and organize students' thinking toward the learning outcomes of current activities.
Exploration	Exploration experiences provide students with a common base of activities within which current concepts (i.e., misconceptions), processes, and skills are identified and conceptual change is facilitated. Learners may complete lab activities that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation.
Explanation	The explanation phase focuses students' attention on a particular aspect of their engagement and exploration experiences and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors. This phase also provides opportunities for teachers to directly introduce a concept, process, or skill. Learners explain their understanding of the concept. An explanation from the teacher or the curriculum may guide them toward a deeper understanding, which is a critical part of this phase.
Elaboration	Teachers challenge and extend students' conceptual understanding and skills. Through new experiences, the students develop deeper and broader understanding, more information, and adequate skills. Students apply their understanding of the concept by conducting additional activities.
Evaluation	The evaluation phase encourages students to assess their understanding and abilities and provides opportunities for teachers to evaluate student progress toward achieving the educational objectives.

Relating Computational Thinking to CCSS Mathematics

Computational Thinking

1. Decomposition
2. Pattern recognition
3. Algorithmic design
4. Abstraction

Many people ask? “Why don’t we teach kids the math I learned when I was little”To develop strong computational skills first we begin with conceptual understanding then expect procedural fluency.