Recommendations for STEM Integration in the USA and Connections with the Flemish InkleurModel

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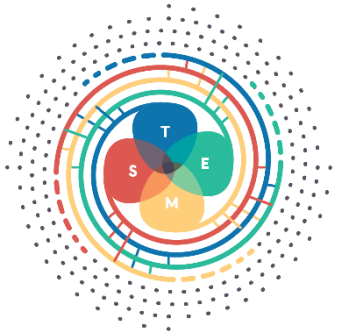
Founder/CEO, Hall Education Services, LLC

STEM

Science • Technology • Engineering • Math

Vlaanderen
is onderwijs & vorming

InkleurModel for STEMeducation



What?

Relevant connections

STEM world
To be
colored by
schools

Why?

1. Learn to discover
2. Awake interest for
3. Focus on
the **STEM**-world

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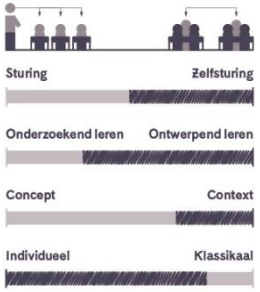
  - A separeted STEM-course
  - Within the existing courses

- Diversity of methodology:



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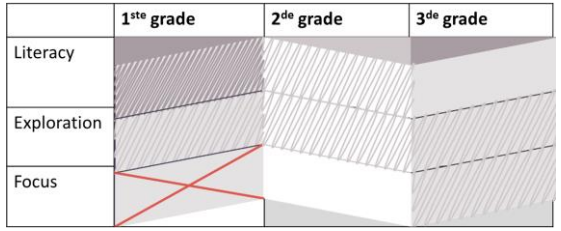

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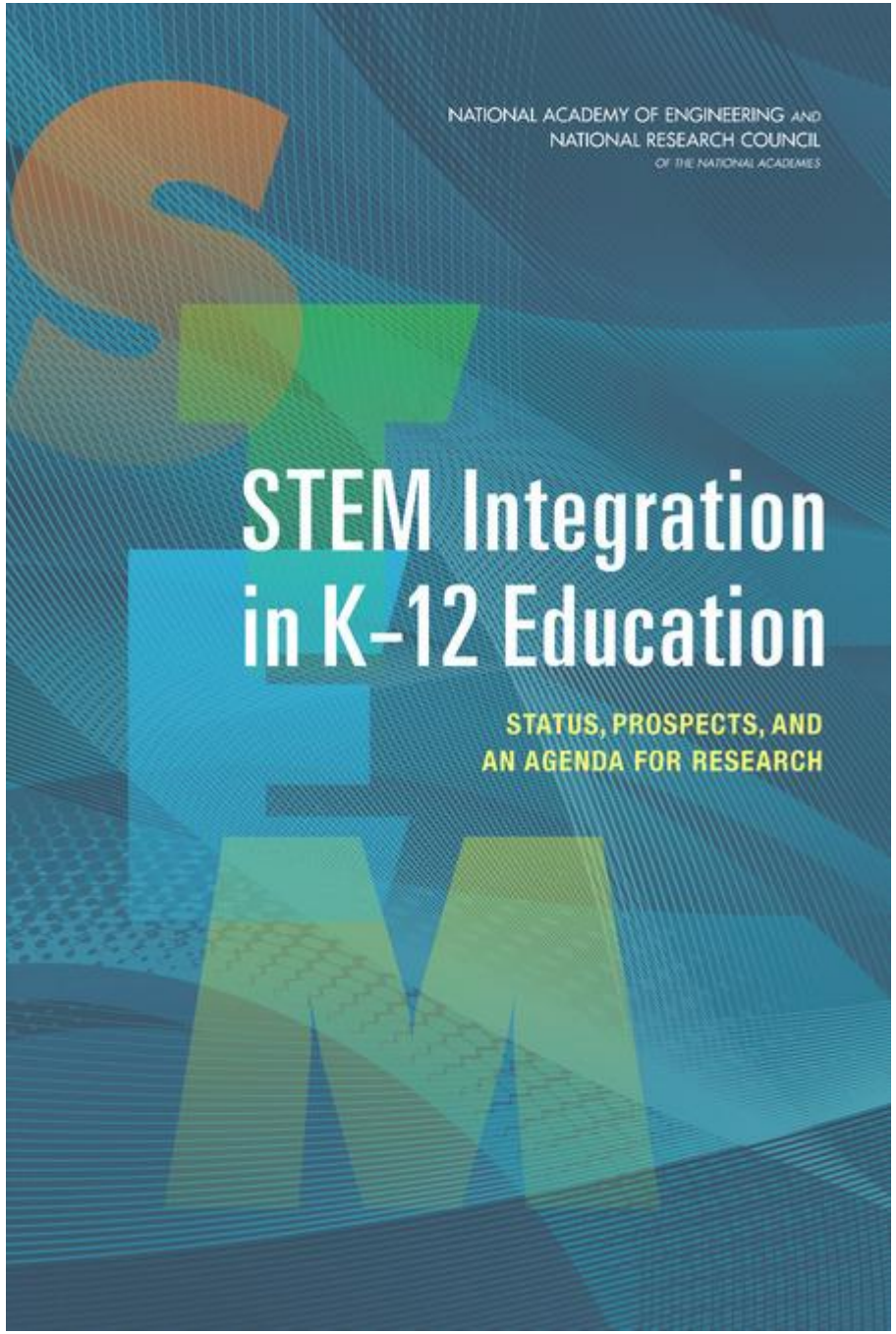

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Recommendation:

Designers of integrated STEM education initiatives need to be explicit about the goals they aim to achieve and design the integrated STEM experience purposefully to achieve these goals. They also need to better articulate their hypotheses about why and how a particular integrated STEM experience will lead to particular outcomes and how these outcomes should be measured.

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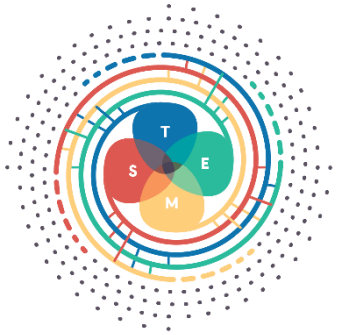

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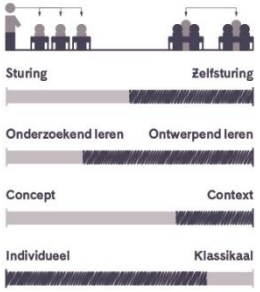

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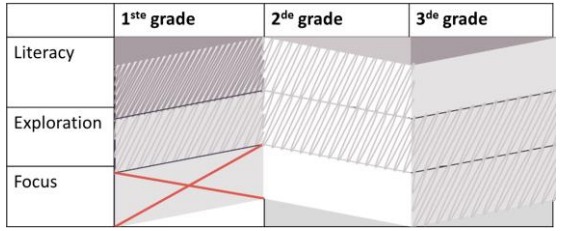

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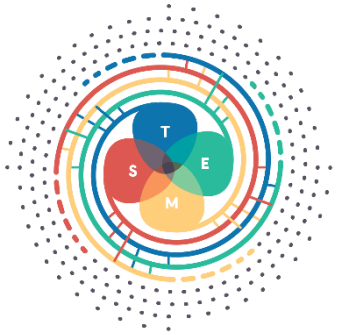

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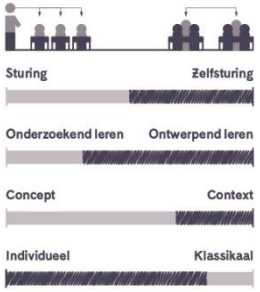

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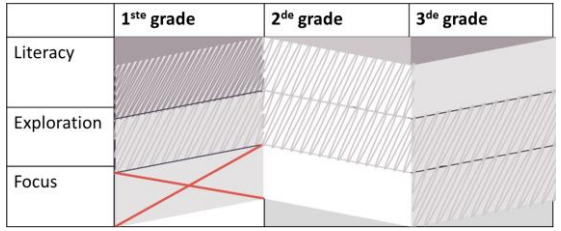
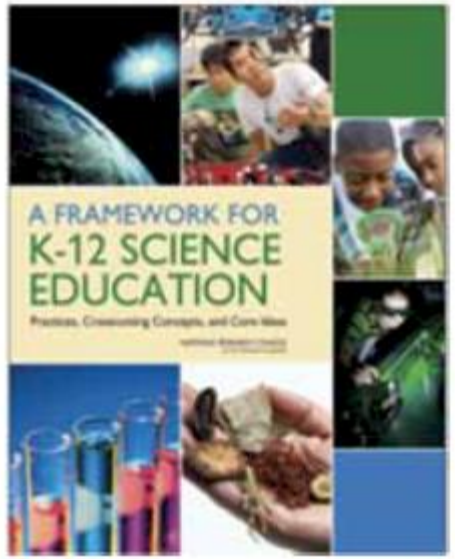


National Research Council

A FRAMEWORK FOR

K-12 SCIENCE EDUCATION



Released July 19, 2011

http://www7.nationalacademies.org

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Framework Goals: By 12th Grade… (3rd Grade)

All students…

- have some appreciation of the beauty and wonder of science
- possess sufficient knowledge of science and engineering to engage in public discussions on related issues
- are careful consumers of scientific and technological information related to their everyday lives
- are able to continue to learn about science outside school
- have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology

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Currently,

"K-12 science education in the U.S. fails to achieve these outcomes, in part because it is not organized systematically across multiple years of school, emphasizes discrete facts with a focus on breadth over depth, and does not provide students with engaging opportunities to experience how science is actually done. The framework is designed to directly address and overcome these weaknesses."

A Framework for K-12 Science Education

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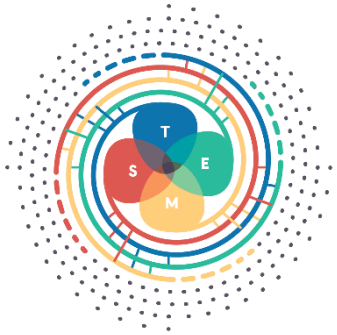

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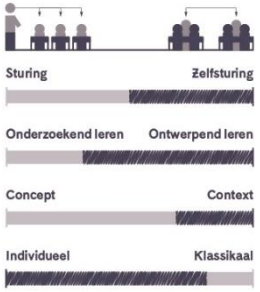

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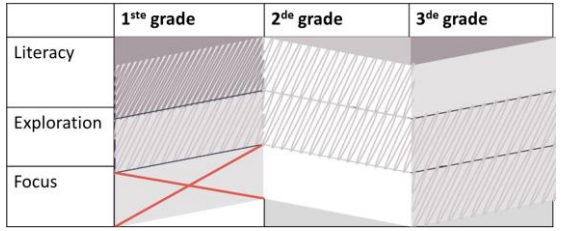

Recommendation:

Designers of integrated STEM education initiatives need to build in opportunities that make STEM connections explicit to students and educators (e.g., through appropriate scaffolding and sufficient opportunities to engage in activities that address connected ideas.)

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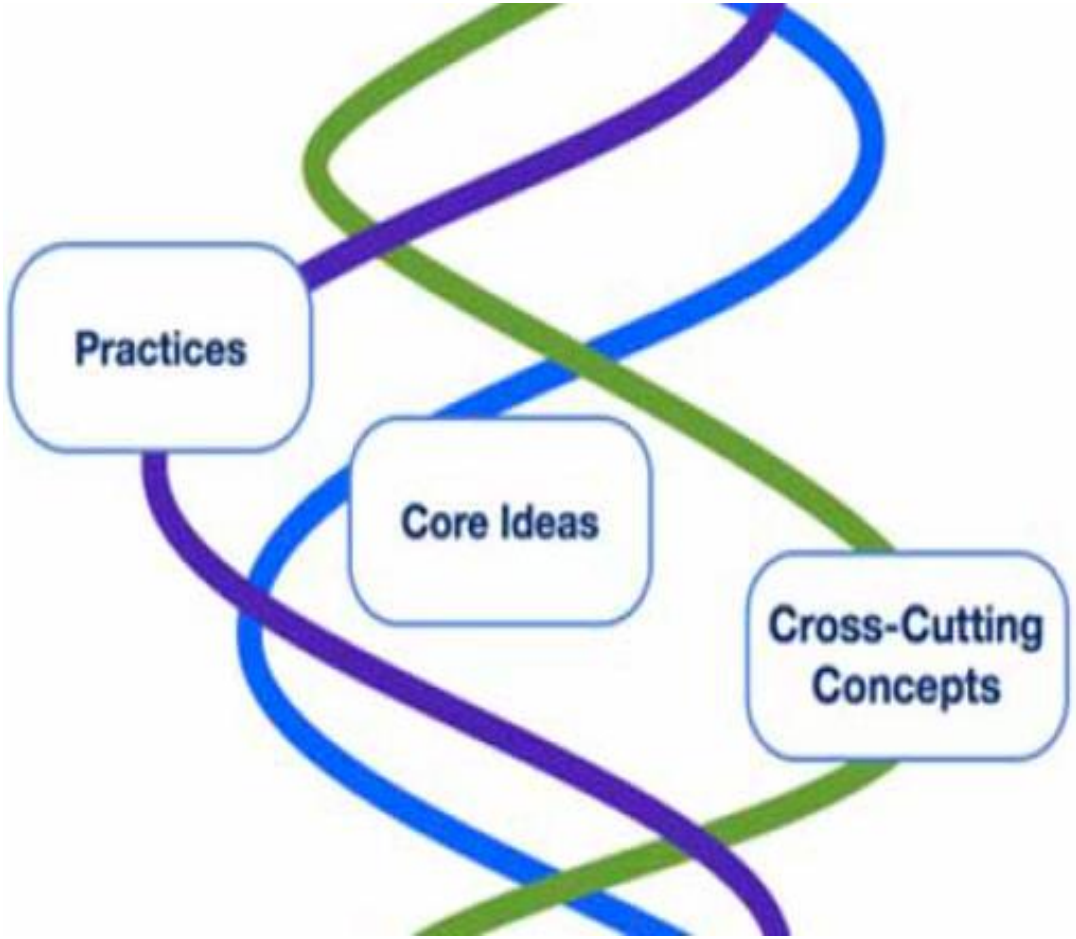
Framework for K-12 Science Education

- Three Dimensions intertwined

Scientific and Engineering Practices

Crosscutting Concepts

Disciplinary Core Ideas



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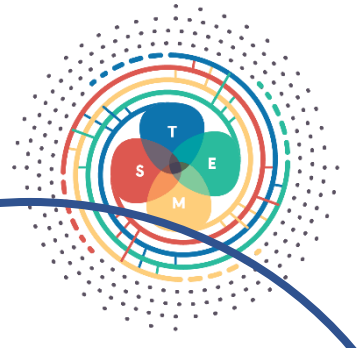

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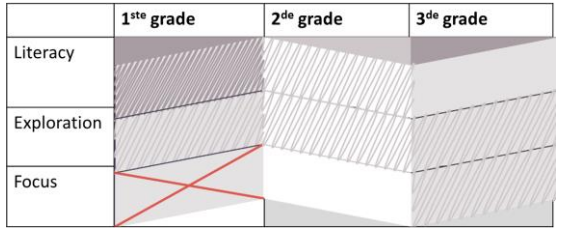

Recommendation:

Designers of integrated STEM experiences need to attend to the learning goals and learning progressions in the individual STEM subjects so as not to inadvertently undermine student learning in those subjects.

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Programs that prepare people to deliver integrated STEM instruction need to provide experiences that help these educators identify and make explicit to their students, connections among the disciplines. These educators will also need opportunities and training to work collaboratively with their colleagues, and in some cases administrators or curriculum coordinators will need to play a role in creating these opportunities. Finally, some forms of professional development may need to be designed as partnerships among educators, STEM professionals, and researchers.

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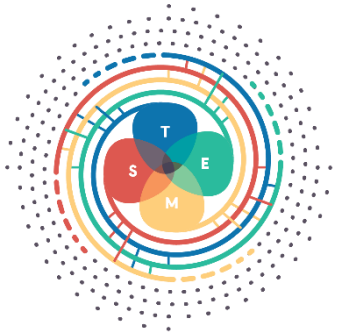

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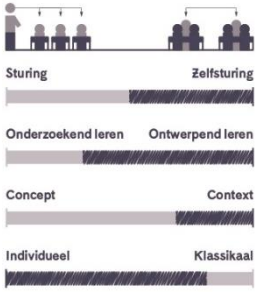

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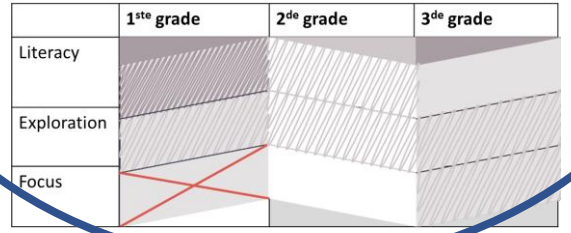

The STEM Immersion Guide for Schools and Districts

A Collaboration of Arizona STEM Network Led by SFAz and Maricopa County Education Service Agency

Updated December 9, 2014

Exploratory Model	Introductory Model	Partial Immersion Model	Full Immersion Model
The Exploratory Model describes a regular school day experience, with STEM-related EXTRA CURRICULAR opportunities offered to students in addition to the regular school day. These experiences may include, but are not limited to; after school clubs, summer programs, science fairs, robotics clubs, video production clubs, etc.	The Introductory Model describes a regular school day experience, with STEM-related experiences offered in addition to the current curriculum. These experiences may include, but are not limited to; integrated STEM units delivered once the state testing is complete, supplementary stand-alone learning units offered through industry or non-profit partnerships, etc.	The Partial Immersion Model describes a non-traditional school experience where STEM-related experiences are integrated into the curriculum. These experiences may include, but are not limited to; teaching to a school-wide STEM theme, teaching year-long integrated problem/project-based learning units, teaching dual-enrollment programs, teaching in a "school within a school" model, etc.	The Full Immersion Model describes a non-traditional school experience where STEM-related experiences determine the school's curriculum. Full Immersion schools look more like 21st Century work-place environments rather 20th century K-12 school environments. Problem-based learning drives the curriculum and instruction. Students constantly collaborate to solve authentic problems, propose solutions, and contribute ideas to the larger community.
A 1.Exploratory Model Descriptors: •School or district has defined STEM as a priority •STEM programs are traditionally ***"stand alone"*** •Programs are conducted ***outside*** the regularly scheduled school day •Programs are assigned to staff as additional duties •Programs are optional •Includes a ***basic level*** of family engagement and outreach programs (i.e. math and science	*A 2. Introductory Model Descriptors:* •Implementation in addition to the regular school curriculum ***during the school-day*** •Opportunities are provided for student participation in problem-solving and project-based instruction with integrated content across STEM subjects •Results in teaching through product development (school/parent presentations, science fairs, evening STEM nights, etc.) •Initial collaboration with one or	*A 3. Partial Immersion Model Descriptors:* •Integration of problem/project-based learning into the regular curriculum through STEM signature programs •Opportunities are provided for student participation in problem-solving and project-based instruction ***with integrated content across STEM subjects*** •Interdisciplinary instruction •Some inter-grade level planning •Emphasis on product development •Several collaborations with	*A 4. Full Immersion Model Descriptors:* •***Whole school*** approach to teaching STEM education through a global mission and vision •Participation by all schools staff, classroom and special area teachers •STEM lessons are planned and aligned by all grade levels and special area classes to be integrated, spiraling in increased complexity and rigor, and constructivist in nature •Provides an opportunity for student participation in problem/project-based instruction with an end result of teaching through product

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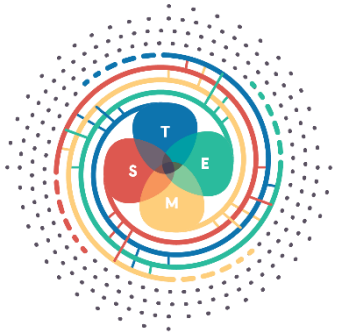

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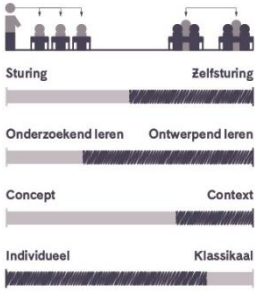

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