



Belmont Public Schools  
Science & Technology/Engineering  
Department

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Plan of Action  
2019 - 2026



# Presentation Goals

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- Remind the School Committee and viewers of the Curriculum Program Review Process
- Summarize the Internal and External Review process and show the connections between the findings and our Plan of Action
- Articulate the Plan of Action for the Science and Technology/Engineering department K-12
- Update the School Committee on our work done so far

# Executive Summary

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The Science and Tech/Engineering department undergoes a curriculum review circle every 7 years (with pandemic adjustments, the most recent cycle started in 2020 and will conclude in 2027)

- Internal and External reviews yielded insights into student and community appreciation for science education and desire for increased communication, faculty strengths, a snapshot of Belmont's progress in realizing the vision of the 2016 Massachusetts state Sci/Tech Standards
- The Plan of Action is composed of steps to increase family communication, finalize curriculum alignment, provide necessary professional development and materials, and grow tech/engineering opportunities for students.
- Areas of 3-D assessment and increased engineering opportunities for Belmont students are underway and will need more work/resources

# The Sci/Tech Steering Committee

Co-Chairs: Liz Baker & Jess DeFrances

Volunteer members over the years 2015-2022

## Elementary:

- Janet Carey, Winn Brook, Principal
- Jenn Scranton, Science Facilitator
- Kelly Hiltz, Winn Brook, K
- Brenda Johnston Burbank, 1
- Suzy Ackerman, Winn Brook, 3
- Adrienne Dinh, Wellington, 3
- Jess Endres, Wellington, 4
- Jessica Ames-Balicki, Burbank, 4
- Steve Tenhor, Wellington, 4
- Christina Westfall, Wellington, 4

## Middle School:

- Yasmin Khan, 5
- Lizz Gentes, 6
- Ben Ligon, 6
- Shoba Reginald, 7
- Joanne Marks, 8
- Jon Marks, 8
- Vanessa Bullard, 8
- Terrance Wong, Tech/Eng
- David Beebe, Tech/Eng

## High School:

- Mark Abruzzese, Chemistry
- Julie Kim, Biology
- Kate McLeod, Technology
- Allison Elfreth, Biology
- Marc Lefebvre, Physics & Technology

## Parents:

- Sharon Fletcher
- John Doyle
- Cyndi Reitmeyer
- Glenn Wong

# 7-Year Program Review Cycle

The review cycle has been designed to meet the following needs:

- ★ A process to support both curriculum changes and instructional improvement from a district level lens to ensure vertical alignment.
- ★ A review cycle which is manageable for elementary teachers who are impacted by changes in many instructional areas.
- ★ A method for the equitable distribution of funding for materials, staffing, curriculum work, and professional development among all departments and all levels.

## Phase 1 (1 year)

Introduction of the new Plan  
for Action

## Phase 2 (up to 2 years)

Development of  
recommended  
curriculum changes and  
instructional  
improvements.

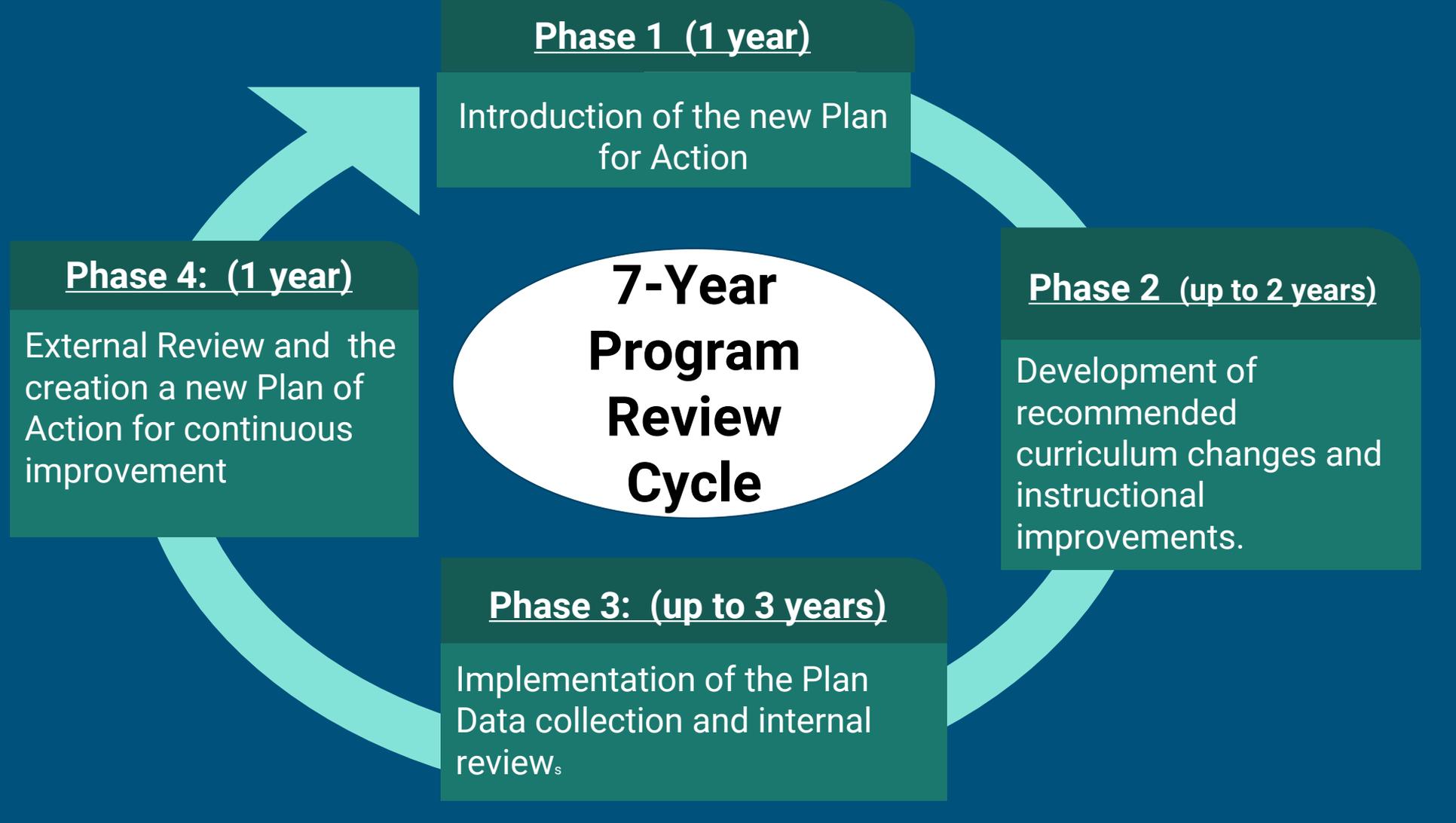
## Phase 3: (up to 3 years)

Implementation of the Plan  
Data collection and internal  
reviews

## Phase 4: (1 year)

External Review and the  
creation a new Plan of  
Action for continuous  
improvement

# 7-Year Program Review Cycle



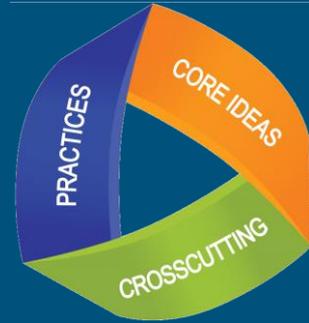
School Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	-Present Plan of Action (PoA) to School Committee and stakeholder groups -Create annual goals aligned with PoA	-Develop and implement annual goals aligned with PoA	-Develop and implement annual goals aligned with PoA	-Develop and implement annual goals aligned with PoA -Begin planning for internal program review	-Continue implementing PoA -Complete plan for internal evaluation	-Conduct internal evaluation -Prepare for external evaluation	-Conduct external evaluation -Develop PoA
2021-22	Science, Technology & Engineering	English Language Arts & Reading	Visual & Performing Arts	Mathematics	Social Studies	Physical Education and Health	World Language
2022-23	World Language	Science, Technology & Engineering	English Language Arts & Reading	Visual & Performing Arts	Mathematics	Social Studies	Physical Education and Health
2023-24	Physical Education and Health	World Language	Science, Technology & Engineering	English Language Arts & Reading	Visual & Performing Arts	Mathematics	Social Studies
2024-25	Social Studies	Physical Education and Health	World Language	Science, Technology & Engineering	English Language Arts & Reading	Visual & Performing Arts	Mathematics
2025-26	Mathematics	Social Studies	Physical Education and Health	World Language	Science, Technology & Engineering	English Language Arts & Reading	Visual & Performing Arts
2026-27	Visual & Performing Arts	Mathematics	Social Studies	Physical Education and Health	World Language	Science, Technology & Engineering	English Language Arts & Reading

# 7-Year Program Review Cycle STE Timeline



# Vocabulary Preview

- **3D Learning**
  - Learning and assessment that incorporates “disciplinary core ideas”, “scientific practices”, and “crosscutting concepts”
- **Crosscutting concepts**
  - Concepts that apply to all domains of science
- **NGSS**
  - The national Next Generation Science Standards which form the basis for the 2016 Massachusetts STE Curriculum Frameworks
- **Science and Engineering practices (SEPs)**
  - The 8 skills scientists and engineers use in their work
- **Anchoring phenomenon**
  - A real-world, engaging science phenomenon that anchors all of the learning in a given unit of study
- **Culturally responsive teaching**
  - Using students’ customs, characteristics, experience, and perspectives as tools for better classroom instruction



# Guiding Questions:

1. To what extent is the science curriculum effectively developed, implemented, and aligned?
2. To what extent are we engaging students in the Science and Engineering Practices?
3. To what extent are we using effective assessment practices in Science and Technology classes?
4. To what extent are we preparing students to engage with recent advancements in science and technology?
5. What are the available resources in the science and technology/engineering department and are there unmet needs?

# Internal Review (2017-2018)

The screenshot shows the Chenery Middle School website. The header includes the school logo and navigation links: Home, School Info, Curriculum (highlighted), PTO, Contact Us, Resources, and a search icon. Below the header, the page title is "SCIENCE" with a breadcrumb "Curriculum > Science". A left sidebar lists various curriculum areas, with "Science" selected. The main content area is titled "Science" and contains a paragraph describing the science program for grades 5, 6, 7, and 8. Below this, there is a section for "Lower School" with a sub-section for "Ecosystems" listing four bullet points: "What is an ecosystem?", "How do matter and energy move in an ecosystem?", "What makes an ecosystem healthy or unhealthy?", and "How do ecosystems change?". At the bottom of this section, it says "Green Living/The Earth's Systems".

## Key Takeaways

- **Students:** CMS and BHS Students feel prepared for their science courses and would like to see a wider variety of science electives.
- **Parents:** More than 50% of parents wanted better, clearer, more easily accessible information about curriculum
- **Staff:** Staff are knowledgeable about current shifts in standards and note the current schedule, contact time and/or growing class sizes can limit opportunities to conduct more open-ended investigations.

# External Review Process

When: April 2019



Evaluators:

## High School

Michael Griffin, Bedford Public Schools  
Program Administrator, Science, Engineering and Technology

Stephen Ribisi, Jr., Ph.D., Weston Public Schools  
Science Department Head, 6-12

## Middle School

Jennifer L. Craddock, Ph.D., Newton Public Schools  
Curriculum Coordinator K-8, Science, Technology and Engineering

## Elementary

Rebecca Katsh-Singer, Ph.D., Westborough Public Schools  
preK-6 Science Curriculum Coordinator



# External Review

## Key Takeaways - Strengths

- Curriculum, Instruction & Assessment:
  - All units are aligned to the 2016 MA State standards
  - Courses are aligned best where Common Planning Time exists
  - Teachers are knowledgeable about the curriculum shifts
  - Students are actively engaged in their learning frequently
- Student readiness for recent advancements:
  - Knowledgeable faculty who stay up to date
  - Outside resources shared with dept
  - Students engage with authentic applications, expert guest speakers
  - BHS electives bring real-world into focus
- Resources & Unmet Needs:
  - Jess DeFrances, Jen Scranton and Liz Baker's leadership and support for changes
  - Budget to support consumable science and engineering supplies



# External Review

## Key Takeaways - Areas for Growth

- Curriculum, Instruction & Assessment:
  - The incorporation of more real-world phenomena and applications
  - An increase in student-student sense-making
  - Movement towards increased use of 3-D assessment
  - Helping a wider range of students see themselves as scientists/engineers
- Student readiness to engage with recent STEM advancements:
  - Finding space in the current curriculum to incorporate current events more often
  - Bringing in a wider range of elective courses
- Resources & Unmet Needs:
  - Instructional time for science is extremely limited K-4
  - Continued PD to provide students more opportunities to engage in the Science and Engineering Practices
  - Tech/Engineering schedule re-design for continuous learning and student/teacher relationships
  - Dedicated collaboration time 9-12 for teachers teaching the same course
  - 1:1 devices beyond the iPads
  - Class sizes should be 24 or less

# Plan of Action Summary

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- Curriculum, Instruction & Assessment
- Student readiness to engage with recent STEM advancements
- Resources and unmet needs

# Plan of Action Summary

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## Key Initiatives:

- Continue our alignment with the vision of the 2016 STE Curriculum Framework.
- Research, develop and pilot common, 3-D or performance-based assessments K-12
- Increase communication about STE curriculum and engagement with the community

# Plan of Action Summary

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## Key initiatives:

- Continue to grow our Technology and Engineering and Science offerings in the new 7-12 building
- Grow course offerings in Technology and Engineering K-6

# Plan of Action Summary

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## Key initiatives:

- Purchase updated NGSS-aligned curriculum resources for grades 6-12, as they become available.
- Actively seek out, hire, and support science and technology teaching candidates from diverse backgrounds.
- Strive to meet the teacher-to-student ratio inline with OSHA standards for science safety. (1:24)

# Action Steps Completed/Underway

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- Curriculum, Instruction & Assessment
- Student readiness to engage with recent STEM advancements
- Resources and unmet needs

# Action Steps Completed/Underway

- Elementary science units shifts complete in Grades K, 1, 2, and 4
- Engineering challenges in each grade K-5
- Updated curriculum and course websites 5-12
- Added AP Computer Science Principles
- 3-D Assessment PD for 5-8
- Vertical assessment of a Science and Engineering Practice to be piloted 5-8 next year
- Professional Development in both OpenSciEd (CMS) and Modeling (BHS) student-centered pedagogies
- Research into potential Makerspace configurations in nearby districts
- Decrease in the % of sections over 24 in lab courses at BHS

# Anticipated Long-term Investments: Potential Makerspaces

