The Public Schools of Dover and Sherborn

Science and Technology/Engineering
Computer Science
Curriculum Review

Kindergarten to Grade Twelve

Curriculum Review Team
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EXECUTIVE SUMMARY

The Public Schools of Dover and Sherborn conducted a comprehensive K-12 Science and Technology/Engineering (STE) and Computer Science (CS) Curriculum review as a reflective process to review the current STE and CS learning environment for our students. Indicators for review included: curriculum, instruction, assessment and quality of the work of the students, leadership and professional development. Survey questions were designed for parents/families, educators, administrators and students to gain an understanding of how these systems support the teaching and learning for our students and a curriculum team reviewed current curricula documents. The district curriculum review team comprised of district, building and curriculum leadership reviewed these documents and noted findings contained in the report.

CURRICULUM
- To what extent is an organized, articulated up-to-date curriculum in place?

A comprehensive review of the curriculum documents as aligned to the 2016 MA DESE STE and CS standards revealed many commendable actions. The grades 6-12 curriculum will be aligned with the frameworks and there is horizontal alignment within schools. K-5 educators are collaborating across both schools to align the curriculum, with professional development occurring during this school year. A need for vertical articulation at transition grades is warranted as is professional development time to craft units and provide additional training in the eight practice standards for our elementary educators.

INSTRUCTION
- To what extent are research-based, best instructional practices being implemented?

Instructional strategies to assure that we are meeting the needs of learners are in place. Data analysis shows that educators employ varied instructional strategies to engage learners and use data to inform instructional decisions. There are some areas for improvement as educators would like to review ways in which we meet the needs of diverse learners, incorporate opportunities for students to collaborate during learning, and review the current allocation of time for instruction to assure it meets the needs of the curriculum and the learners.

ASSESSMENT AND THE QUALITY OF THE WORK OF THE STUDENTS
- To what extent are assessments that reflect student learning goals in place, being implemented, and used to inform instruction?

Assessing student learning is key to determining what students know, are able to do, understand and can explain. Educators hold students to high expectations and use a variety of assessments to inform instruction and to assure student learning. Educator comments indicated that a variety of assessments are used but one area for improvement is the in-depth and comprehensive analysis of these assessments as part of grade/department level time.

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LEADERSHIP
- To what extent is there leadership in place that ensures skillful management of the program, operations, and resources that promote an effective learning environment?

Effective leadership is key to assuring that the curriculum, instruction and assessment is implemented as intended. Each building administrator is responsible, with, where designated, STE or CS department chairs and curriculum leaders, to assure an effective learning environment for our students. Educator surveys supported the agreement that leadership encourages and supports of the content and teaching STE and CS and that they receive accurate useful feedback on their instruction. An area for improvement is to assure that there is a STE or CS leader at each building and to continue to provide structures to support the supervision and evaluation of our educators.

PROFESSIONAL DEVELOPMENT
- To what extent is there a focus on improving teaching skills and capacity to implement the articulated curriculum?

While there are structures in place to support educator capacity to implement the articulated curriculum, professional development of our educators and leaders by crafting a focused plan for this professional development is needed. Educators articulated areas that they would like to focus, specifically teaching inquiry and practice standards and differentiating instruction. Educators noted that professional development time is needed to collaborate with peers on the craft of teaching.

SUMMARY
This comprehensive review of the Kindergarten through grade twelve Science and Technology/Engineering and Computer Science curriculum, instruction, assessment and quality of the work of the students, professional development and leadership structures in the Public Schools of Dover and Sherborn afforded the district an opportunity to delve deeply into the teaching and learning of STE and CS for all students. There are aspects that are celebrated. More importantly, there are actionable steps to further strengthen the work that all do to ensure each what student knows, does, understands and can explain.

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INTRODUCTION

At the start of the 2016-2017 school year, the Public Schools of Dover and Sherborn were charged with conducting a Kindergarten through grade twelve Science and Technology/Engineering and Computer Science Curriculum Review. The district-wide curriculum review team undertook this task as a vehicle to highlight student learning and as a reflective process to review the current science, technology/engineering and computer science learning environment for our students. This report contains a historical outline of the implementation of the Kindergarten through grade twelve Science and Technology/Engineering and Computer Science standards-based curricula, describes the evaluation and review process, indicates findings, and makes recommendations for the future.

HISTORICAL BACKGROUND

The Public Schools of Dover and Sherborn have used a standards-based Science and Technology/Engineering (STE) program since 1999, commencing with publication of the STE curriculum frameworks. These frameworks were updated in 2001, 2006, and, most recently, in 2016. In January 2016, the first ever MA DESE Digital Literacy and Computer Science (CS) standards were published, and the Kindergarten to high school educators began to align our curriculum to these standards.

CURRICULA REVIEW PROCESS

During the fall of 2016, a grades Kindergarten through twelve STE and CS curricula review was conducted. This multi-faceted review was informed by the National Study of School Evaluation guidelines: Indicators of Schools of Quality Program Evaluation Series. The district reviewed the grades K-12 STE and CS curricula by examining the current written curriculum, in conjunction with instructional and organizational systems currently in place to support student learning.
To facilitate this work, the district convened a STE and CS curricula review team comprised of: The High School Science Department Chair, the Middle School Science Curriculum Leader, the Regional Technology/Engineering Department Chair, Middle and High School Headmasters, Elementary Principals, and teacher leaders - whose charge was to develop the evaluation process, protocols, and subsequent action steps.

EVALUATION PROCESS

The Indicators of School Quality (see below) were used to frame the evaluation process, which consisted of the development and administration of surveys to all constituencies and an educator/curriculum leader curricula review team. To best gain the perspective of all constituencies, a survey was developed and conducted for all grades Kindergarten to twelve

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educators (n= 78), parents (n=209, K-5 n=99, 6-12 n=130), administrators (n= 7) and grade 5 students (n=156), grade 7 students (n=162), and grade 10 students (n=128). Parent survey respondents spanned all four schools and grade levels from Kindergarten to twelve. Grade level educators and curricula coordinator(s) comprised the curricula review team who reviewed curricula documents. These evaluation tools were developed to gain information on the following:

Evaluation Components - Overview, Analysis, and Action Steps
(based on National Study of School Evaluation guidelines, Indicators of Schools of Quality: Program Evaluation Series)

Indicators of Schools of Quality (National Study of School Evaluation, 2000)
- Instructional systems, specifically curriculum, instruction and assessment
  - To what extent is an organized, articulated, up-to-date curriculum in place?
  - To what extent are research-based, best instructional practices being implemented?
  - To what extent are assessments that reflect student learning goals in place, being implemented, and used to inform instruction?
- Organizational systems, specifically leadership, professional development and culture of continuous improvement
  - To what extent is there leadership in place that ensures skillful management of the program, operations, and resources that promote an effective learning environment?
  - To what extent is there a focus on improving teacher skills and capacity to implement the articulated curriculum?
- Quality of the work of the student
  - To what extent do students meet or exceed benchmark expectations of curriculum essentials in the subject under investigation?

EDUCATOR PROFILE

Seventy-eight K-12 educators responded to our survey. Educators from Kindergarten to grade 5 comprised forty-eight respondents, grades 6-8 educators comprised eight respondents and grades 9-12 educators comprised fourteen respondents (note: some high school faculty teach at more than one grade level) with eight special educator respondents.

Sixty percent of Dover Sherborn educators have been in the district for over ten years with twenty-six percent of educators with less than five years' experience and fourteen percent of educators with between five and ten years' experience. The longevity of our education staff affords consistency in programming, and the new to Dover Sherborn staffs' strength in education is supported through strong mentoring and induction programming. The collaborative dialogue amongst staff supports the strong educational programming in place. Data from the educator

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surveys indicates that sixty percent of K-5 educators consider themselves to be strong STE or CS educators with 100% of grades 6-12 educators. The high percentage at this level could be attributed to the fact that these educators are certified in their content area.

CURRICULUM

- To what extent is an organized, articulated up-to-date curriculum in place?
  - Curricula aligned with frameworks
  - Vertical and horizontal alignment
  - Curricula documents accessible, used and current
  - Curricula materials current and representative or articulated curriculum

OVERVIEW

During the 2011-2012, the Public Schools of Dover and Sherborn began the process of writing curriculum using the Understanding by Design, UbD, (Wiggins and McTighe) format, which consists of three stages. Stage One identifies essential questions, enduring understandings, MA DESE standards, and what students should know, be able to do, understand and explain by setting objectives for concepts and skills. Stage 2 includes identification of assessments and Stage 3 outlines any learning activities. At the conclusion of the 2016 school year, all STE content in grades six through twelve will have completed the Stage 1 process for the standards as aligned to the MA DESE 2006 STE standards. At the elementary level, UbD began in the 2015-16 school year, with educators engaged in professional development across both schools. Since our elementary educators teach all four content areas, the alignment of the STE standards was postponed in anticipation of the January 2016 release of the new standards.

Essential to any curriculum is the vertical (Kindergarten to grade twelve) and horizontal (specific to one grade level) alignment of the curriculum. Since there is only one grades 6-8 and one grades 9-12 school, horizontal and vertical alignment is assured within these buildings. Educators meet as a department each month to discuss curriculum, instruction and assessment. At the elementary level STE and CS alignment is addressed during team meetings and professional development sessions, with this year's focus on STE and CS. Since the 2015-16 school year, both elementary schools are collaborating together to align STE curriculum horizontally across both schools. A vertical alignment will occur with the one Kindergarten to grade five unit per that is being written during the 2016-17 school year.

In the area of computer science the first ever published MA DESE standards were released in January 2016, so the curriculum writing and aligning process is just beginning for this content area. Grades K-5 have completed UbD Stage 1 for technology and a new computer science curriculum was added for the 2016-2017 school year. During the 2015-16 school year, a grade 6-12 Technology/Engineering Department Chair was approved and, in the past year and half, this department has come together to vertically align offerings and to create, propose, and add new

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courses to meet those needs. At the middle school, technology and computer science educators have re-aligned offerings and are currently working towards completing Stage 1 by the end of this school year. Subsequent units will be written next year. High school offerings were reconfigured to include web design and social media and existing offerings were updated to reflect 2016 standards. The process of conducting the curriculum review highlighted the work that needs to continue.

With the January 2016 release of STE and CS standards, all STE and CS K-12 educators are engaged in a review of curriculum documents to align with the new standards. This new version highlights the focus on conceptual understanding and application of concepts in the areas of life, physical, earth science and engineering design, with each of the core ideas and eight practices part of the pre-K-12 progression.

The eight practices are:
1. Asking questions (for science) and defining problems (for engineering).
2. Developing and using models.
3. Planning and carrying out investigations.
4. Analyzing and interpreting data.
5. Using mathematics and computational thinking.
6. Constructing explanations (for science) and designing solutions (for engineering).
7. Engaging in argument from evidence.
8. Obtaining, evaluating, and communicating information.

Elementary educators across both schools focused on writing one unit that is aligned to one strand of STE per grade level and have engaged in professional development to redesign these units to assure consistency across both schools (horizontal alignment). Additionally, professional development has been provided to incorporate the eight practices into these new units, with a focus on inquiry.

Grades six through twelve educators have engaged with a review of curriculum documents and these units will be aligned by the end of the 2016-17 school year. These include the eight practices and common assessments for these units. From the educator surveys, seventy-nine percent of all K-12 educators agree that they participate in coherent district-wide planning and ongoing support for curriculum and instruction. This is important as educator ownership of the process is essential for meaningful alignment.

ANALYSIS
To gain a greater understanding of the impact of this work and to understand whether the curriculum is aligned to the frameworks with documents accessible, used and current, several educator survey questions revealed these findings:

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When educators were asked if the STE and/or CS curriculum is aligned to the 2016 DESE STE and CS standards and their confidence in using it, 35% of K-5 educators agreed, 100% 6-8 educators and 58% of 9-12 educators agreed. The low percentage at the elementary school level is indicative of the fact that the standards are new as of January 2016 and the current 2016-17 school year provides the first opportunity to align curriculum and revise units, which is one of three district goals. At the high school level the moderate percentage could be informed by the fact that the MCAS at the high school level will not reflect the 2016 standards until the 2018-19 school year, so prior to the 2018-2019 school year, these educators will be held to the 2006 STE standards.

Elementary work on aligning to the 2016 MA DESE STE and CS standards began in earnest during the 2015-16 school year and continues. The middle school has done considerable work in aligning curriculum standards to units and has completed this process and the work is underway at the high school level, with Stage 1 to be completed by June 2017. Fifty-eight percent of K-5 educators, 87% of grades 6-8 educators and 93% of grades 9-12 educators indicated agreement that the curriculum is clearly articulated as to what students should know, do, understand and explain. The high frequency of grades 6-12 educator responses again is most likely due to the work done in the past year and the focus on teaching a specific content area, while elementary educators are responsible for the four content areas. With limited professional development time for the 2016-17 school year, the district has focused on using early release days to conduct the STE and CS curriculum review process to ensure STE and CS focus for our educators.

The Curriculum Review teams at each grade span noted the need for time to review the curriculum and develop a comprehensive curricula plan, the need for a job-alike collaboration across the district and or out-of-district, release time together as a department for ongoing update and review of the standards, for reviewing newly published resources, and to create new lessons.

One hundred percent of grades 6-12 educators and 62% of grades K-5 educators agree that investigation, experimentation, design and analytical problem solving are central to the curriculum, highlighting the importance of the eight practices. Ninety-three percent of grades 6-12 educators agree that the program affords opportunities for students to collaborate in scientific and technological endeavors and to communicate their ideas, while 59% of K-5 indicated such. These ideas are important to the study of STE/CS and additionally highlight the focus and continued work at the elementary level which is viewed as important by the schools for alignment.

In the open response comment area of the educator survey, one need identified was an update of materials was warranted. Each department chair and curriculum leader, in conjunction with their building administrator, has brought this need for additional materials to budget discussions.

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Since the surveys encompassed a review of many constituent groups, eighty-nine percent of parents agreed that the STE program conveys high academic expectations for all students and eighty-three percent agreed that they understood the STE content their child knows and is able to do. Student respondents noted that 96% of grade 5, 90% of grade 7, and 94% of grade 10 students agree that their STE experience has prepared them for their next year.

SUMMARY-CURRICULUM

- To what extent is an organized, articulated up-to-date curriculum in place?
  - Curricula aligned with frameworks
  - Vertical and horizontal alignment
  - Curricula documents accessible, used and current
  - Curricula materials current and representative or articulated curriculum

A comprehensive review of the curriculum documents as aligned to the 2016 MA DESE STE and CS standards revealed many commendable actions. The grades 6-12 curriculum will be aligned with the frameworks and there is horizontal alignment within schools. K-5 educators are collaborating across both schools to align the curriculum, with professional development occurring during this school year. A need for vertical articulation at transition grades is warranted as is professional development time to craft units, review resources, and provide additional training in the eight practice standards for our elementary educators.

ACTION STEPS - CURRICULUM

Action	Timeline
Continue writing units in grades K-5, using the collaborative process across both schools, designating any updated curriculum material needs	June 2018
Provide professional development time for vertical alignment of the curriculum, specifically at transition grades of five to six and eight to nine	June 2018 and ongoing
Continue to provide professional development to elementary educators to learn science content and to apply eight practices	June 2017 and ongoing
Continue to review Computer Science offerings at the high school, and suggest additional offerings, as needed	December 2017

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INSTRUCTION

- To what extent are research-based, best instructional practices being implemented?
    - Instruction aligned with curriculum
    - Instruction employs data-driven decision making
    - Instruction engages student learning
    - Instructional supports available for all students
    - Varied instructional strategies employed
    - Instruction promotes self-directed learning

OVERVIEW

The tenets of this subgroup highlight the importance of teaching STE and CS and the complexities associated with that instruction. The infusion of the eight practices and inquiry as outlined in the curriculum section, supports instruction by engaging students, employing varied instructional strategies and self-directed learning.

ANALYSIS

To questions associated with engaging student learning, ensuring instructional supports and varied instructional strategies available to all students, and using the data from their interactions with students to inform instructional practices, educator respondents findings included:

- 94% of educators take students' prior understanding into account when planning curriculum and instruction,
- 100% of educators listen to/ask questions about student work in order to gauge their understanding of content concepts,
- 95% provide flexible grouping for students as part of their instruction, and
- 98% of educators indicated that they differentiate instruction for students needing additional supports.

Seventy-three percent of educators agreed that they consider how the curriculum design reflects an understanding of the range of ways that diverse students learn, an area that might need some support. One focus of the new standards is collaboration amongst students, and 68% of educators agree that the curriculum program affords opportunities for students to collaborate in scientific and technological endeavors and to communicate their ideas, another area that might warrant additional support.

Learning about STE is important to our students, with over ninety-five percent agreeing with this statement. Ninety-five percent of all student respondents indicate that their classwork is appropriate for them.

Ninety-five percent of grade 5, 7 and 10 students agree that learning about STE is important to them and the same percentage agreed that they feel prepared for class each day.

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Students in all three grades felt comfortable asking questions in class (~95%) with a similar percentage indicating that their classwork was appropriate for them. Ninety percent of students indicated that grading standards were fair with ninety-five percent agreeing that they receive helpful feedback from their teacher on their work. These high percentages reflect the importance of our educators' work to assure all students' access the curriculum.

Adequate time allotted to instruction supports our students' acquisition of needed concepts and skills. Eighty-five percent of administrator respondents indicated that time allocated to instruction matches the needs of the content, instructional materials, and student population. Thirty-four percent of Kindergarten through grade five educators, 100 % of grades 6-8 educators and 70% of grades 9-12 educators believe sufficient time is allocated for content instruction. The low percentage at the elementary level reflects the comments made by elementary curriculum review teams, which indicated "to effectively teach the guiding principles, ample time for exploration, investigating, making mistakes and learning from them...students need large chunks of time which are hard to find for ELA and math." Another elementary team comment noted "we need more time in our schedules to devote to content area. Even when I integrate math and ELA into the science lessons, I still need chunks of time to just teach science." Middle school curriculum review team noted "inquiry and PBL are time taking activities and there needs to be a balance between doing science and covering science."

SUMMARY
- To what extent are research-based, best instructional practices being implemented?
  - Instruction aligned with curriculum
  - Instruction employs data-driven decision making
  - Instruction engages student learning
  - Instructional supports available for all students
  - Varied instructional strategies employed
  - Instruction promotes self-directed learning

Instructional strategies to assure that we are meeting the needs of learners are in place. Data analysis shows that educators employ varied instructional strategies to engage learners and use data to inform instructional decisions. There are some areas for improvement as educators would like to review ways in which we meet the needs of diverse learners, incorporate opportunities for students to collaborate during learning and review the current allocation of time for instruction to assure it meets the needs of the curriculum and the learners.

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ACTION STEPS - INSTRUCTION

Action	Timeline
Convene grade span educators to design instruction that meets the need of diverse learners, and to infuse opportunities for students to collaborate	June 2017 and ongoing
Review current allocation of time for STE and CS instruction and make recommendations	June 2017 and ongoing

ASSESSMENT AND QUALITY OF THE WORK OF THE STUDENTS

- ● To what extent are assessments that reflect student learning goals in place, being implemented, and used to inform instruction?

OVERVIEW
The key to determining what students know, are able to do, understand and can explain is how educators assess student learning. This assessment happens in two ways. The first way is the use of formative assessments, where educators conduct a range of formal and informal assessment during the learning process in order to modify teaching and learning activities. For example, educators may ask students to answer a short poll, or use exit tickets where students are asked to summarize key points, etc. The information from the formative assessments is used in planning subsequent lessons. The second way is summative assessments, which are conducted at the end of the unit and are used to summarize students' key understandings. Assessing students affords our educators key understandings about student learning and are used to inform instruction and evaluate student learning.

ANALYSIS
A variety of assessments are used to assure student learning. Educator surveys indicated that eighty-eight percent of educators agree that the program conveys high academic expectations for all students, noteworthy as all students are held to high expectations for learning. A balance of assessments are used by our educators, some examples included selected response, brief constructed response, products-essays-research, performance and process-focused assessments. Ninety-two percent of educators indicated that they agreed that regular assessments are used to inform student learning, guide instruction, and evaluate student progress and ninety-four percent of all educators agreed that decisions about student learning are made as a result of an analysis of a variety of sources, common assessments, formative and summative assessment, MCAS, etc.

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One area for improvement was the in-depth and comprehensive analysis of student performance on common assessments, as only forty-four percent of educators indicated somewhat and thirty-six indicated yes they do this as a group. To facilitate this process, school-based teams need to meet regularly to analyze student work and to inform instruction and next steps in teaching and learning. Only fourteen percent of educators indicated that yes this occurs and fifty-two percent indicated it somewhat occurs, highlighting a need for a more formal process and dedicated timeframe to do this work.

Ninety-three percent of grade 5, 7 and 10 students agree that they receive helpful feedback from their teacher on their work. Ninety-seven percent of grade 7 and 10 and ninety-three percent of grade 5 students agree that the grading/standards used by my teacher are fair.

Only sixty-five percent of parents agree that they receive accurate reports of their child's progress in STE, which might indicate a need to communicate more with families as to their child's progress in STE. Sixty-three percent of parents indicated that they assist their child in learning STE at home. Interim progress reports, delivered through Aspen, are provided in grades 6-12 and parent conferences coupled with twice yearly reports of student progress are available for our K-5 parents.

SUMMARY
- To what extent are assessments that reflect student learning goals in place, being implemented, and used to inform instruction?

Assessing student learning is key to determining what students know, are able to do, understand and can explain. Educators hold students to high expectations and use a variety of assessments to inform instruction and to assure student learning. Educator comments indicated that a variety of assessments are used but one area for improvement is the in-depth and comprehensive analysis of these assessments as part of grade/department level time.

ACTION STEPS - ASSESSMENT

Action	Timeline
Develop protocols for educators to share data on assessments with grade/department colleagues	June 2017
Share common formative and summative assessment across grade/department so educators can collaborate on assessing student learning and identify exemplars of formative and summative assessment	June 2017 and ongoing

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Action	Timeline
Use the results of assessments to assist students and parents in understanding student attainment of the stated standards	June 2017 and ongoing

LEADERSHIP

- To what extent is there leadership in place that ensures skillful management of the program, operations, and resources that promote an effective learning environment?

OVERVIEW

For any content area, effective leadership is key to assuring that the curriculum, instruction and assessment is implemented as intended. STE curriculum leaders, a stipend position, are in place at Pine Hill and the Middle School. There is a stipend STE Department Head at the High School. Professional Learning Community Leaders, stipend positions, oversee grade-level curriculum and revision at Chickering and its Technology Integrator oversees computer science. At the Region, there is a stipend grades 6-8 Technology and Engineering Department Chair, who oversees CS. Each building administrator is responsible for all the teaching and learning at each school, with a Principal/Headmaster and Assistant Principal/Assistant Headmaster at each building.

ANALYSIS

Educators were surveyed as to their agreement that leadership encourages and supports current content and teaching practices, with eighty-seven percent agreeing. An important aspect of teaching and learning is the useful feedback on their instruction from their supervisor, where seventy-five respondents agreed with this statement. One hundred percent of educators indicated that their leader supports the content and teaching of STE/CS.

Administrators noted that while there is leadership for STE and CS at their school and that they felt a supervisor was responsible for coaching and/or evaluation of educators in this content area, as based on the MA DESE frameworks, one area of improvement noted was educators collaborating through a variety of activities, department meetings, and planning teams. At the elementary level, there is no formal STE or CS department, as might be configured at the middle or high school with a building-based Science Curriculum Leader or Department Chair.

SUMMARY

- To what extent is there leadership in place that ensures skillful management of the program, operations, and resources that promote an effective learning environment?

Effective leadership is key to assuring that the curriculum, instruction and assessment is implemented as intended. Each building administrator is responsible, with designated STE or

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CS department chairs and curriculum leaders, to assure an effective learning environment for our students. Educator surveys supported the agreement that leadership encourages and supports the content and teaching of STE and CS and that they receive accurate, useful feedback on their instruction. An area for improvement is to build K-12 oversight of STE and CS and to continue to provide structures to support the supervision and evaluation of our educators.

ACTION STEPS - LEADERSHIP

Action	Timeline
Investigate leadership structures to support educators and the vertical and horizontal alignment of K-12 STE/CS curriculum	December 2017
Continue to provide structures to support the supervision and evaluation of educators in the areas of STE/CS	ongoing

PROFESSIONAL DEVELOPMENT

- To what extent is there a focus on improving teacher skills and capacity to implement the articulated curriculum?

OVERVIEW
Professional development provides a forum for educators to learn new curriculum and instructional strategies, to use data from assessments to inform instruction, and to meet the needs of diverse learners. The Public Schools of Dover and Sherborn provide numerous opportunities for educators to avail themselves of professional development. First and foremost is the job-embedded PD that educators experience in collaboration with their colleagues. The middle and high school have formalized structures for this to occur through monthly department meetings led by a curriculum leader or department chair, and elementary educators have different structures. Educators can and do propose summer workshop funding and have a $400 graduate course reimbursement available to them. Elementary educators have eighteen early release days and middle and high school educators have six early release days, some of which are focused on STE or CS.

ANALYSIS
Professional development is the cornerstone of how our educators improve the craft of teaching and learning.
When asked what areas they see to increase their ability to:
- Differentiate Instruction   27%

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- Teach inquiry   55%
- Use student work to inform instruction   18%
- Increase the use of guiding principles into my practice   18%
- Increase the use of practice strategies as outlined in the framework   55%
- Provide effective feedback on student assessment   36%
- Other
    - Create and evaluate common assessments during common planning time
    - Design and implement common assessments

These survey results support the areas of curriculum where educators seek to learn more about teaching inquiry and the practice strategies as was noted in previous sections. In the area of instruction, twenty-seven educators rated a need for professional development in differentiating instruction, also noted in this report. For assessment, educators seek to gain insight on how to provide effective feedback on student assessment.

Open response comments from educators noted the need for professional development time to revise curriculum, to meet as grade/department level to create units with other educators, and a need for specialized PD in any new content areas.

SUMMARY

- To what extent is there a focus on improving teacher skills and capacity to implement the articulated curriculum?

While there are structures in place to support educator capacity to implement the articulated curriculum, professional development of our educators and leaders by crafting a focused plan for this professional development is needed. Educators articulated areas that they would like to focus, specifically teaching inquiry and practice standards and differentiating. Educators noted that professional development time is needed to collaborate with peers on the craft of teaching.

ACTION STEPS - PROFESSIONAL DEVELOPMENT

Action	Timeline
Survey and plan content PD for educators, including the ideas of differentiating instruction, teaching inquiry and practice strategies, and providing effective feedback on student assessment.	Survey May 2017 Action plan in place for SY '17-18
Schedule targeted time for curriculum writing	Ongoing

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REPORT SUMMARY

This comprehensive review of the Kindergarten through grade twelve Science and Technology/Engineering and Computer Science curriculum, instruction, assessment, professional development and leadership structures in the Public Schools of Dover and Sherborn afforded the district an opportunity to delve deeply into the teaching and learning of STE and CS for all students. As is noted above, there are aspects that are celebrated. More importantly, there are actionable steps to further strengthen the work that all do to ensure what each student knows, does, understands and can explain.

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