EXCERPTS from a District Report—Identifiable Information Redacted

After a state-level change in the STATE Standards of Learning for Science in 2018 (STATE Department of Education, 2022), the District began adapting LEA instructional materials to meet the requirements of the new standards—that included unit assessments, classroom curricular materials, and instructional guidelines.

To ensure the changes truly met the needs of educators to maximize student learning in science, the District enlisted EdMetric LLC (EdMetric) to conduct a study to measure an alignment of state-level documentation to the resources developed locally including the implementation of those materials.
EdMetric created specific actionable recommendations that DISTRICT X can apply to improve and/or redevelop curriculum, emphasizing a thorough study of District-developed materials and assessments, educator survey results and a synthesis of focus group interviews of educators (teachers and administrators at all levels).

This multi-pronged comprehensive approach included four overarching tasks:
Task 1—Alignment study and needs assessment
Task 2—Logic model and protocol development
Task 3—Data collection and analysis
Task 4—Report of findings and recommendations

For Task 1, EdMetric staff developed alignment and needs assessment protocols that were further honed with DISTRICT X staff input. The alignment study and needs assessment called for both external and internal data collections and interviews.

Task 2 included EdMetric's methodological approach to the auditing process using a logic model (see Table 2). It also incorporated auditing protocols co-developed with the DISTRICT X District Office's science and curriculum staff (see Table 3).

In Task 3, the inclusive data collection and analysis used best practice methodologies and finally, after a thorough analysis of all data, Task 4 culminated in the development of a comprehensive presentation of findings and recommendations for DISTRICT X.

TASK 1—ALIGNMENT STUDY AND NEEDS ASSESSMENT

Task 1 consisted of several elements. In the first, EdMetric completed an analysis of the existing curriculum. In order to complete this task, EdMetric content experts evaluated the District's current written curriculum to identify areas of alignment to the State's Standards. This involved reviewing curriculum documents, pacing guides, textbooks, and the instructional materials used by teachers and staff.

Simultaneous to the curriculum audit, EdMetric content experts evaluated the District-developed assessments. Using the backward design model designed by Wiggins and McTighe (2005), we looked for alignment of the assessments to the state's standards. In doing so, we highlighted any areas that were weakly or not aligned and developed recommendations. Recommendations considered the vertical articulation of content area standards in grades 3–high school for which assessments had been written.

Once EdMetric content experts completed the analysis of the curriculum and assessments, we conducted a gap analysis in which we compared the identified learning objectives or competencies from the Standards with the corresponding elements in the existing curriculum. The goal was to identify any gaps or non-alignments where the curriculum and assessments did not adequately address the standards or included content that is not part of the standards.

The alignment study and needs assessment conducted in Task 1 consisted of two primary components—external data and internal data collection. Each data collection set identified below is discussed thoroughly throughout this report.

The External Data Collection included the following components:

- Alignment of the Curriculum to Standards: The data collection process involved examining the alignment of the curriculum with the State's Standards. Attention was given to determining whether the curriculum demonstrated strong, partial, or no alignment to the Standards. This analysis helped in evaluating the degree to which the curriculum met the required standards.

- Presence or Absence of Differentiated, Enrichment, and Remediation within the Curriculum: Another aspect considered during data collection was the presence or absence of differentiated instruction, enrichment activities, and remediation strategies within the curriculum. This information determined whether the curriculum provides access to the diverse learning needs of students and provides the additional support or challenges needed for effective instruction.

- Alignment of Assessments to Standards: The data collection process also focused on assessing the alignment of District-developed assessments (Grades 3-High School) to the state Standards. This involved evaluating whether the assessments accurately measured the knowledge and skills specified in the Standards both in the breadth and depth called for by the standard. Alignment evaluated whether the assessments effectively evaluate student performance against the established standards.

Internal Data Collection documentation included the following components:

- Staff Surveys: Surveys were conducted at the elementary, middle school, and high school levels to gather specific information. These surveys collected feedback from teachers and administrators regarding various aspects of science instruction. The surveys covered topics such as teaching practices, preparedness, professional development needs, resource availability, the order in which the Standards were taught and the depth to which they were taught. The surveys also collected evidence of the most prevalent instructional strategies used in the classroom (Appendix C).

- Additional Survey Information: Within the surveys, non-identifiable demographic information of the staff was collected by grade-level and course. For elementary teachers, this information included the number of minutes per week dedicated to teaching science, the standards taught to mastery, timing of instruction per quarter, and the balance between active and passive learning methods. Similarly, for secondary teachers, the information included specific courses, strands taught to mastery, timing of instruction, active vs. passive learning approaches, and the need for professional development.

- Administrator Surveys: Data was collected through surveys with administrators. These observations focused on assessing science instructional practices, the quality and quantity of resources available, and the resources dedicated to science instruction, including financial support.

- Focus Group Interviews: Focus group interviews were conducted with administrators and teachers as identified through the initial survey. These discussions provided an opportunity to gather in-depth qualitative information about educators' experiences, perspectives, and insights related to science instruction. The focus groups allowed the interviewers to specifically explore topics such as curriculum alignment, teaching practices, resource availability, and the effectiveness of differentiated instruction, enrichment, and remediation strategies (Appendix D).

Table 1 provides a grid of the data collected throughout the study as well as the alignments and information generated by this study. The overarching goal of this work was to report the overlay of 1) the written curriculum—in this case the District's pacing guides, District-developed materials, and the teacher reported most-oft used materials, 2) the implemented curriculum, also called the taught curriculum, as indicated by educators, 3) the learned or assessed curriculum based on District-developed assessments, 4) the alignment of each to the aforementioned to the STATE Standards by rating them to Depth of Knowledge (DOK) assuming a range of 1-4 of the Standards, and 5) other relevant data.

Table 1 of Alignment Reports and Other Data

	Implemented Curriculum	**Learned/ Assessed Curriculum**	**Standards and DOK**	**Other Data Reported**
Written Curriculum	Pacing guide/ materials and teacher survey alignment	Pacing guide and assessment alignment	Pacing guide/ materials and Standards/ DOK alignment	Teacher perception of instructional resources
Implemented Curriculum		Teacher use and perceptions of the District-developed assessments	Teacher survey and pacing guide Standards/DOK alignment	Time spent weekly preparing for instruction
Learned-Assessed Curriculum			Assessment and Standards/DOK alignment	Instructional data and strategies used by teachers
Standards and DOK				Needed professional development
				Use of differentiation, remediation, and enrichment

Overall, the data collected through these methods facilitated a comprehensive understanding of the current state of science curriculum, instruction, and assessment identifying areas of strength and potential improvement, and used to inform the decision-making processes to enhance the quality of science education in DISTRICT X.

TASK 3—DATA COLLECTION AND ANALYSIS

A district's curriculum is a design plan for learning that requires the purposeful and proactive organization, sequencing, and management of the interactions among the teacher, the students, and the standards (Mishra, 2011). Curriculum provides both the plans for learning and the strategies for delivery those plans.

To ensure the written curriculum matched what teachers teach and students learn, we considered three categories of curriculum (Marzano, 2003) including: Intended or Written Curriculum which is the curriculum produced by a school district and includes state standards, district scope and sequence charts, teacher planning documents and curricular units of instruction. This curriculum may be called an "official curriculum" because it is an effort to guide the instructional program of the school district to assure that district policy is implemented in the classroom. In this study, EdMetric researchers and subject experts audited the locally developed pacing guides and curricular materials.

Implemented or Taught Curriculum is the curriculum teachers establish through lesson plans and instruction. Ideally, the implemented curriculum and written curriculum have a high correlation. While daily lesson plans are not generally considered part of the school's written curriculum, the alignment of lessons to the standards ensures the implemented curriculum and written curriculum align. The surveys conducted for this study served as the means by which to gather the teachers' reported alignment of the implemented curriculum to the district pacing guides and other curricular materials. The interviews conducted with focus groups via Zoom further honed this report.

Attained or Learned Curriculum might be considered the "bottom-line" curriculum because it is the curriculum students learn as measured by the formative and summative assessments. Student proficiency on assessments aligned to the standards indicates successful implementation of both written and taught curricula. Because DISTRICT X has in-house developed and tracked unit assessments, the assessment data was audited to assure alignment to the standards and served as a backdrop of the alignment of all three curricula: written, taught, and attained.

Once the data were collected, the EdMetric team evaluated curricular, assessment, and learning strategies including the examination of teachers' reports of the instructional methods and strategies used in delivering the curriculum. We then used the data to determine the level of alignment within and across the District-created assessments, the written curriculum, and the teacher reported instruction. What follows is a discussion of all the alignments enumerated on page 5.

Alignment of District-Developed Written Curriculum to the STANDARD

Approach. The curriculum was evaluated using methodology adapted from an assessment alignment methodology (Webb, 1997, 1999). In the alignment study, expert content raters first evaluated the content match and strength of alignment of the curriculum to the STATE Science Standards using the DOK level (see Appendix A) and, if appropriate, assigned any secondary Standard alignments. Results of the study are intended to contribute to the evidence gathered by DISTRICT X to support or adjust the District-developed pacing guides and District-provided materials as a measurement of the alignment of the curriculum to the state standards and depth of knowledge.

Method. By utilizing content subject matter experts, the EdMetric team conducted a thorough review of the written curriculum. That included an examination of the alignment of a representative sample of curricular items to the Standards using a methodology adapted from Webb's (1997, 1999) assessment alignment methodology. Content experts reviewed a representative sample of curricular materials selected from the District pacing guides, District-developed materials, textbooks, and other materials. Content experts aligned curricular items to the standards, determined the DOK level, and provided qualitative feedback for DISTRICT X. Content experts looked at the alignment of material consistently across grade-levels and courses. For example, at every grade-level, the District's written curriculum (in this case a pacing guide) has an "DISTRICT X Resources" component. Given the consistency of that element and given the directive from DISTRICT X central office staff, at every grade-level, the DISTRICT X resources were evaluated. Furthermore, across grades and courses, additional, suggested curricular materials from external publishers were examined depending upon availability. As an example, at the lower-grades, STEMScopes textbook materials were examined. At higher grades, Savvas textbook materials were reviewed and aligned. While curriculum was provided for all grade-levels and courses, the primary focus centered on grades Kindergarten through Biology and Earth Science in high school.

The evaluation of alignment was defined as having greater than 75% of curricular items aligned (fully or partially) to Standards and having the full range of DOK (Levels 1-4) represented at each grade level.

Results. Table 4 summarizes the alignment of the curriculum across grades to the STATE Standards. Using a consistent body of materials across grades, content was examined for alignment to the Standards. The number of items represents evidence presented in the curriculum as described above. To that end, a curricular "item" might represent a worksheet, a section of a textbook, or other lesson material.
Each item was aligned to grade-level Standards. Table 4 displays the percentage of the curriculum examined and found to be fully, partially aligned, and those in which no alignment to grade-level Standards were found.

Overall, the written curriculum was aligned to the STATE Science Standards, with 81% (Grade 1) to 100% (Grades Kindergarten, 3, 4, and 5) of the sampled curricular items aligned by grade level, meeting the 75% threshold. The stronger alignment was found in the lower grades where more than 88% of items were fully aligned in Kindergarten through grade 6. In grades 7 through High School, the majority of items were partially aligned (53.9% – 81.2%).

Grade	Number of Curricular Items	Full	Partial	No Alignment
K	42	97.62%	2.38%	0.00%
1	37	78.38%	2.70%	18.92%
2	35	82.86%	2.86%	14.29%
3	37	89.19%	10.81%	0.00%
4	57	98.25%	1.75%	0.00%
5	89	94.38%	5.62%	0.00%
6	106	88.68%	8.49%	2.83%
7	117	6.84%	81.20%	11.97%
8	179	37.43%	56.42%	6.15%
HS-ES	102	38.24%	53.92%	7.84%
HS-BIO	135	24.44%	71.85%	3.70%

Table 5 represents the alignment reported by the content experts of the distribution of DOK across the curriculum. As discussed above, the number of curricular items represents evidence presented in the curriculum as described above—an "item" might represent a worksheet, a section of a textbook, or other lesson material. Items that were found to be not aligned to an STANDARD were not assigned a DOK alignment.

All grades demonstrated the full range of DOK (Levels 1-4), with an emphasis on Levels 1-3 (95% in Kindergarten to 89% in grades 2 and 7).

Table 5—DOK Across District-Developed Curriculum

Grade	Number of Curricular Items	1 – Recall	2 - Skill/Concept	3 - Strategic Thinking	4 - Extended Thinking	No Alignment
K	42	33.33%	35.71%	26.19%	4.76%	0.00%
1	37	38.14%	30.40%	23.67%	7.78%	18.92%
2	35	18.60%	45.71%	24.26%	11.43%	14.29%
3	37	35.14%	43.24%	10.81%	10.81%	0.00%
4	57	29.82%	45.61%	14.04%	10.53%	0.00%
5	89	37.08%	31.46%	23.60%	7.87%	0.00%
6	106	31.91%	52.13%	7.55%	8.42%	1.89%
7	117	17.09%	61.19%	10.71%	11.01%	11.11%
8	179	7.82%	75.21%	7.82%	9.15%	6.15%
HS-ES	102	15.62%	59.17%	16.67%	8.53%	7.84%

HS-BIO	135	8.70%	61.16%	23.63%	6.51%	3.70%

Further analysis revealed an occasional non-alignment of the pacing guides and curricular materials. Table 6 displays where the above-mentioned curricular items did not align with the District-developed pacing guides (tables for each individual grade- or course-level can be found in Appendix B).

Table 6-Non-alignment of Grade-level Pacing Guides and Curricular Materials by Standard

Standard	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Standard 1	2	K, 2, 6, 7, ES, BIO	6, 7, 8, ES, BIO	1, 2, 6, 7, 8, ES, BIO
Standard 2		6, 8		5, 8
Standard 3	ES	7	5, 7, 8	5, 8
Standard 4	5	8		5, 8
Standard 5		7		5, 8
Standard 6	5			5, 8
Standard 7	8	5	8	8
Standard 8		5		5, 7, 8
Standard 9				8
Standard 10			8, ES	8
Standard 11				8
Standard 12				

Discussion. When examining the alignment of the curriculum to the Standards, across most grades and courses, there was a strong alignment. A notable exception occurs in grades 1 and 2 which have an integrated format; the curriculum may be more strongly aligned to a math or English standard than to the science standards. For example, while students may be asked to write about a science topic, the rubric is more closely aligned to the writing standards than to the science standard. In grades 7 and above, one sees an increase in partial alignments. It is likely that as the standards become increasingly more complex, developing curriculum and pacing guides that align to the whole standard (and therefore fully aligned) becomes increasingly more difficult.

When determining the alignment of the written curriculum to DOK, there is representation across all of the levels of cognitive complexity at all grade- or course-levels. While all are represented, the evidence suggests more of the curriculum falls into the DOK 2 level than the others. That suggests there may be opportunities as curriculum is revisited to increase the level of rigor in learning materials.

Qualitative Feedback. The content expert raters offered the following feedback:

- In Kindergarten, although the activities often align to the standard, the cognitive complexity (DOK) and difficulty of the directions, analysis, and the vocabulary expected may extend well beyond the kindergarten level.
- In the lower grades (and especially grade 5), there are repeating activities—verbatim—from previous years. Alternative projects that cover the same standards would be more beneficial to review previous standards.
- In upper grades, the pacing guides are not aligned to most recent flex-books (Version 2.0).
- In high school, but particularly in Earth Science, the unit pacing guide has 15 lessons which would be impossible to complete within the time provided for the unit. The risk is that the teacher may simply choose to complete some of the lessons, but not all of them. That would not allow for consistency across multiple classrooms or schools and would create validity issues in the teaching the curriculum.

Alignment of District Benchmark Assessments to the Standards

Approach. As was true of the written curriculum, the District-developed science assessment items were evaluated using a modified Webb (1997, 1999) methodology. In the alignment study, expert content raters first evaluated the content match and strength of alignment of each item to the STATE Science Standards. If appropriate, they assigned any secondary standard alignments.

or adjust the District- developed Unit Assessments as a measurement of the state's content standards.

The evaluation of alignment was defined as having greater than 95% of assessment items aligned (fully or partially) to Standards. For DOK, we expected to have all items align to Levels 1-3 with an equal distribution across the levels (approximately 33% per level at each grade). We did not expect Level 4 items in the assessment item pools due the item types.

Method. In this modified Webb (1997) approach, alignment was examined at the level of the test bank and test event. Each level provides a different piece of information in terms of alignment. At the level of the test bank, EdMetric examined each item's alignment to the Standards. Using Webb's indicators for DOK, EdMetric examined the breadth and depth of the assessment item pool as administered at the classroom level.

EdMetric established an overall degree of alignment based on criteria that best reflect the study purposes. Criteria were developed based on concepts from Webb (1997, 1999).

Results. Table 7 summarizes the alignment of the items in each assessment to the STATE Science Standards. Overall, the DISTRICT X items were fully or partially aligned across all domains (100% in grades 3, 4, 5 and Biology to 98.16% in grade 8). There is an uptick in assessment items partially aligned in Grade 7 and above.

Table 7—District Assessment Alignment to Standards

Grade or Course	Alignment Strength to Science Standards			
	Item count	Full	Partial Alignment	No Alignment
3	50	90%	10%	0%
4	104	94.23%	5.77%	0%
5	167	83.83%	16.17%	0%
6	162	87.04%	12.35%	0.62%
7	171	47.47%	50.88%	1.75%
8_PS	163	50.31%	47.85%	1.84%
HS_BIO	173	52.02%	47.98%	0%
HS_ES	135	31.11%	47.98%	0.74%
Grand Total	**1125**	**66.99%**	**32.39%**	**0.62%**

As seen in Table 8, when examining DOK, the majority of the items were designated as DOK 1 (Recall) or DOK 2 (Skill/Concept). Some (10.3%) of items were designated by a DOK 3 rating and no DOK 4 items were designated on the DISTRICT X Unit Assessments. Overall, most items were rated as DOK levels 1 and 2 (98.00% in grade 3 to 83.23% in High School Biology), suggesting opportunities to develop items that tap Strategic Thinking (Level 3).

Table 8—DOK Rating of District Assessment Items

Items by Grade or Course	DOK				
	Item count	1 - Recall	2 - Skill/Concept	3 - Strategic Thinking	4 – Extended Thinking
3	50	56.00%	42.00%	2.00%	0.00%
4	104	38.46%	48.08%	13.46%	0.00%

5	167	32.34%	51.50%	16.17%	0.00%
6	162	37.04%	49.38%	13.58%	0.00%
7	171	30.99%	59.06%	9.94%	0.00%
8_PS	163	10.43%	86.50%	3.07%	0.00%
HS_BIO	173	22.54%	60.69%	16.76%	0.00%
HS_ES	135	12.59%	80%	7.41%	0.00%
Grand Total	**1125**	**30.05%**	**59.65%**	**10.30%**	**0%**

Typically, educational assessments require at least six items as the minimum for an assessment scale to measure content knowledge related to a standard and for basing decisions about students' knowledge of that standard (Webb, 1999). Table 9 reports the number of Standards that are assessed by six or fewer items on an assessment (see Appendix B for the full item count per STANDARD).

Grade	Standard	Total
3	3.2	0
3	3.3	4
3	3.8	1
7	LS.7	5
7	LS.8	5
8	PS.5	4
8	PS.7	5
HS-ES	ES.3	5
HS-ES	ES.4	6
HS-ES	ES.6	6
HS-ES	ES.10	6

Table 9-Number of Items Assessing a STANDARD Under 6 Occurrences by Grade

Discussion. Overall, the alignment evaluation found evidence to support a claim of alignment of the DISTRICT X item pools to the STATE Standards in all grade levels and across criteria.

The slight spike in partial alignment designation in grade 5 and may be expected given teachers are reviewing below grade-level standards for the grade-span science Standard assessment administered in the spring. Another spike of partial alignments occurs in the upper grades (especially in grades 8 and above) and may be worthy of further examination. It likely reflects the larger more complex standards in upper grades in which only part of the said standard is measured by the item. It is nearly impossible for a single multiple-choice item to capture the complexity of the standards in one question. That would provide a reasonable explanation of the increase in partially aligned items to State standards as one moves up through the grades.

then reported to staff, students, and parents as mastered.

Qualitative Feedback. The content expert raters offered the following feedback:

- On the 5th grade unit assessments, there are several items measuring weather; however, there are no 5th grade weather standards.
- Across grade levels, the assessments use the same pictures or graphics. While it may be a year between administrations, some students may be confused if they remember a picture or graphic from a previous year's test.
- Understanding it's a pre-test, some assessments use the exact same item from a previous year's test.
- In terms of content, some pre-assessment standards do not match the final unit assessment.
- For example, the grade 5 Unit 4 pre-test is over the solar system, but the Unit 4 test post-test is largely over energy with little to no alignment to 5th grade standards.
- In 7th grade, one unit assessment is focused on the Nature of Science, which is mentioned in the science standard preface, but never aligned to a specific 7th grade standard.
- There are multiple errors across the assessments and across grades. Some a simple as spelling errors, but some are more egregious—like items with incorrect keys or items.
- The majority of the items are fully aligned to the standard.
- The majority of items are DOK 2.
- Overall, it seemed as if the assessments were manageable and able to be completed in one class period (not extensive tests).
- There are some missed opportunities to write items to a higher depth of knowledge.
- As far as test design is concerned, it seemed as if most of the questions are multiple-choice questions and do not allow for different item types to assess different ways of knowing.

Alignment of District-Developed Assessment to the Written Curriculum

Approach. Using the data, a comparison was made of the degree of alignment between the District-developed assessments and the written curriculum—specifically the pacing guides. When considering the link between learned curriculum and written curriculum, this comparison examined the degree to which the assessed curriculum and written curriculum align. District-developed assessments are written for grades 3-Biology. This evaluation was conducted at the assessed grades.

Methods. The written curriculum laid out in the District's pacing guides provides the projected learning that students should possess at the end of a unit of study—in this case, the intended STANDARD to be taught in the unit. The pacing guide, when compared with the District-developed assessment, should align. That is, the District is assessing what is expected by the pacing guide in each unit. Here the subject matter expert review of the assessment content was compared with the pacing guide provided to teachers at each grade- level.

The assessments, which are administered by unit of study, were designated by the quarter in which they are taught according to the pacing guides. Criteria for alignment were applied as follows:

- To be designated as "aligned," the standards indicated in the pacing guide and the standards in the assessment had to be present.
- If the pacing guide indicated the standard but the content expert assessment ratings did not see the standard listed, the two elements were considered "not aligned" OR if the pacing guide did not have the standard listed but the content expert assessment ratings determined the standard was assessed, the two curricular elements were determined to be "not aligned."

Results. Overall, alignment of the written curriculum to the assessments was variable (Appendix B, Tables 12-19), ranging from one instance of non-alignment (High School Biology) to 19 instances (Grade 8). Note that a pattern of non-alignment in grades 5 and 8 for Quarter 4.

Instances of non-alignment ranged from none (Standards 1, 3, 9, 10, and 11 in Quarter 1; Standards 1, 11,

and 4 in Quarter 4). By grade level,

Using the same format utilized above, Table 10 indicated where there was no alignment between the unit assessments and the pacing guide for each quarter. The full tables for each individual grade- or course- level can be found in Appendix B.

Table 10—Non-Alignment of Pacing Guides and District-developed Assessment by Grade

Standard	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Standard 1				3, 4, 8, ES
Standard 2	3, 5, 7	6, 7, 8	5, 7, 8	4, 5, 8
Standard 3		4, 7	5, 7, 8	4, 5, 8
Standard 4	3, 5, ES	3, 5, 8		5, 8
Standard 5	4, 6	5, 7	5, ES	5, 7, 8, ES
Standard 6	5, 6	3, 5	3	5, 8
Standard 7	8	5, 6, 8	7, 8, ES	4, 5, 8
Standard 8	3, ES	5, 7, ES	BIO	3, 5, 8
Standard 9		7, ES	5, 6, 7	8
Standard 10		7	8	8
Standard 11				7, 8, ES
Standard 12	ES		ES	

Discussion. Overall, alignment of the assessments to the pacing guides was variable (Appendix B, Tables 12-19). Specifically, in quarter 4, the pacing guides expect standard 1 to have already been taught, but they are largely unassessed in quarter 4. One could assume that since standard 1 is essential to teaching the science practices that it is no longer assessed in quarter 4 because it is assumed to be mastered at that point. Another point to examine is the number of assessment-to-pacing guide non-alignments in quarter 4 versus other quarters. It is likely, since most of the quarter 4 pacing guides contain a great deal of remediation, it stands to reason there would be non-alignment across the assessments and pacing guides. One assessment to pacing guide alignment is particularly strong and that is Biology.

Feedback. Since the District-developed assessments are used by teachers and administrators and are reported to parents, it is important that the written and assessed curriculum match. Without that alignment, there's likely to be misunderstanding and frustration across all stakeholders. If the scores are reported with transparency regarding the written curriculum (including the reasons why one might see non-alignment—for example a review of previous year's learning), some confusion may be mitigated.

Alignment of Implemented Curriculum

Approach. In order to measure the implemented curriculum, one must rely on the direct input of educators. When determining the alignment of the other curricular measures (the standards, the written, and the assessed curriculum) to that which is implemented in the classroom, EdMetric used a two-stage survey method to gather input directly from educators. The intent of this section is to report on the implemented curriculum and the teachers' perception of the curriculum and the materials provided to them. The surveys administered to educators had multiple purposes. Although the questions were modified slightly by grade-span, the intent of the questions generally fell into one of several camps: instruction, curriculum, resources, assessment, and other (see the full surveys in Appendix C and full survey results in Appendix E).

Stage 1 – Educator Survey

As a first step in this project, EdMetric staff, with assistance from the DISTRICT X central science curriculum staff, issued a multifaceted anonymous survey to all K-12 science educators (teachers and administrators)

to collect information on curriculum, assessment, instruction, professional development, and the quality and quantity of instructional tools available to staff. The purpose of the survey was to provide direction to

the survey administered in the spring of 2023.

Stage 2 – Educator Interviews

In the second phase of this task, we conducted focus group interviews via Zoom to better understand how educators interpreted survey topics and to further define the educators' perceived characteristics of successful curriculum, assessment, professional development, and instructional tools. The interviews were intended to provide further clarification to the themes revealed from the coding of the initial educator surveys.

Methods. In the survey created with DISTRICT X input, teachers were asked to determine the degree to which they perceived written curriculum was implemented as well as capture perceptual data regarding the instructional strategies they most often employ, the resources they use and prefer, and their perceived needs for professional development. The survey questions fell into five overarching umbrellas explored below.

Questions falling under the Instruction category were designed to gather the degree to which the implemented curriculum tied to STATE Standards. Those questions included:

1. Which Standards do you teach to mastery?
2. Which Standards (over the course of the year) do you introduce, reinforce, or teach to mastery?
3. At what level of DOK do you typically teach the Standards?

Questions under the Curriculum category were designed to determine the educator's use and perceived value of District provided curriculum.

1. Rate the usefulness of the District provided pacing guide.
2. When do you teach each STANDARD (by quarter)?

DISTRICT X provides educators with numerous resources both physical and virtual. In this section, teachers were asked to identify which of the provided resources were used and identify the quality and quantity of those materials.

1. Do District-provided materials aid with differentiation, remediation, and/or enrichment?
2. Rate the quality of resources used.
3. Rate the quantity of resources used.
4. Share the most often used resources.

Although the District assessments are part of the written curriculum, DISTRICT X is unique in that they provide District-developed benchmark assessments at grades 3 through high school. Teachers were asked to determine the quality of the assessments and to share how they used the results of those assessments.

1. Rate the quality of the District provided assessments.
2. Share how the assessment results are used.

The remaining category—Other—includes an assortment of categories to gather teachers perceived professional development needs and the instructional strategies teachers use most often.

1. How much time per week do you spend prepping for science instruction?
2. What kind of professional development would be useful?
3. Which data is used to inform instruction?
4. How often do you use hands-on strategies?
5. Which instructional strategies do you typically use?

In the stage 1 anonymous survey, teachers were provided an open item in which they could provide any additional feedback as well as volunteer to serve in the stage 2—focus group interviews. The questions asked of the administrators mirrored those asked of teachers with the distinction that administrators were asked to share their observations of the above categories as they completed their duties as building leaders.

them to provide their email if they were willing to offer additional input. The resulting four focus group interviews reflected a purposeful sample of the diversity of DISTRICT X teachers across four groups—elementary, middle school, high school, and administrators (Table 11).

Results.

Respondents

There were 150 unique respondents for the DISTRICT X survey, representing 5% of the teacher and administrator staff. Table 11 shows the distribution of educators by grade-level and course—while educators were only able to complete one survey, they could indicate multiple courses or grade-levels.

Table 11—Distribution of Survey Respondents by Grade or Course in Stage 1

Building Level/Role	N	Grade or Course
Administration	21	14-Elementary 4-Middle school 2-High school 2-K-8
Elementary Teacher	83	15-Kindergarten 9-First grade 16-Second grade 10-Third grade 10-Fourth grade 14-Fifth grade 1-K-5 2-Gifted 1-Title I 1-Science lead 1-ESL 1-2,4,5 grades
Middle School Teacher	20	11-Sixth grade 6-Sixth grade honors 3-Seventh grade 1-Seventh advanced 11-Eighth grade 1-Eighth grade honors 2-Environmental science 5-Earth science 1-Specialty
High School Teacher	26	2-Astronomy and Meteorology 15-Biology 4-Chemistry 4-Earth Science 5-Ecology 8-Environmental Science 1-Forensic Science 1-Anatomy and Physiology 1-Oceanography 5-Physics 1-AP Environmental Science 1-AP Earth Science

Discussion. The input provided represented a cross-section of teachers and administrators. Every grade level and multiple courses were represented in the results.

Alignment of Implemented Curriculum to DOK

perceptions of the level of cognitive rigor to which they teach on a regular basis.

Methods. As described above, the methodology remained the same across all discussions of the implemented curriculum. Specifically, teachers were asked: Using Depth of Knowledge, at what complexity level do you generally teach the Standards? Administrators were asked: Using Depth of Knowledge, as you observe science classrooms, at what complexity do you generally see the Standards taught?

Results. Tables 12, 13, 14, and 15 provide the teachers' perceived level of cognitive complexity at which they teach the science content. The results have been rolled up by grade-span—elementary, middle school, high school, and administrators. There were a few responses in which the educators indicated they could
not open the provided link to a DOK chart (the District's fire wall blocked the link). These data are based on the responses provided.

Tables 12-15—Educators' Perceived Level DOK of Implemented Curriculum

Elementary DOK		
Mostly DOK 1	5	6.02%
Mostly DOK 1 and 2	21	25.30%
Mostly DOK 2	7	8.43%
Mostly DOK 2 and 3	19	22.89%
Mostly DOK 3	6	7.23%
Mostly DOK 3 and 4	11	13.25%
Mostly DOK 4	2	2.41%
Other	12	14.46%

Middle School DOK		
Mostly DOK 1	2	10.00%
Mostly DOK 1 and 2	1	5.00%
Mostly DOK 2	1	5.00%
Mostly DOK 2 and 3	6	30.00%
Mostly DOK 3	0	0.00%
Mostly DOK 3 and 4	6	30.00%
Mostly DOK 4	1	5.00%
Other	3	15.00%

High School DOK		
Mostly DOK 1	0	0.00%
Mostly DOK 1 and 2	2	7.69%
Mostly DOK 2	1	3.85%
Mostly DOK 2 and 3	11	42.31%
Mostly DOK 3	1	3.85%
Mostly DOK 3 and 4	4	15.38%
Mostly DOK 4	1	3.85%
Other	6	23.08%

Administrator DOK		
Mostly DOK 1	1	5.00%
Mostly DOK 1 and 2	7	35.00%
Mostly DOK 2	3	15.00%
Mostly DOK 2 and 3	5	25.00%
Mostly DOK 3	2	10.00%
Mostly DOK 3 and 4	2	10.00%
Mostly DOK 4	0	0.00%

Discussion. Given the possible responses, most elementary teachers believed they taught in the DOK 1-3 range with very few reporting that they teach mostly at a level 3 or 4. Middle school teachers conversely report most of their instruction falls into the DOK 2-4 range. Similarly, high school teachers reported the majority of their instruction falls in the DOK 2-4 range, but administrators reported that the DOK they see as they observe science classrooms falls in the DOK 1-3 range. Those providing responses in the "other" category reported that they could not open the link, or reported a larger range: for example, 1-3 or mostly 2-3 with an occasional 4.

Feedback. In any classroom, instruction may range across the full spectrum of DOK depending upon the standard being taught, the needs of the students, and whether the standard is being introduced, reinforced,

standards at a higher DOK given that they are specializing in science instruction—that is, they're not expected to teach other content areas simultaneously (like reading, math, writing, etcetera). One area to explore through professional development might include what DOK 3 or 4 instruction looks like and how one might achieve that—especially in the elementary setting.

Alignment of Implemented Curriculum to the Written Curriculum

Approach. Given the aforementioned approach, the next alignment conclusion was to examine educators' perceptions of when they teach each standard by quarter.

Methods. As described earlier, the methodology remained the same across all discussions of the implemented curriculum. Specifically, teachers were asked: When, over the course of the school year, did you teach the grade-level Standards? That information was placed alongside the pacing guide to compare when, during the year by quarter did the pacing guides call for a standard to be taught versus when teachers reported teaching that standard.

Results. Table 16 below highlights two specific scenarios. It shows, by percentage, when teachers report teaching a standard. If the cell is highlighted yellow, the teachers state they teach standards that are not in the pacing guides, and if the cell is highlighted pink, the teachers do not report teaching standards that are in the pacing guides.

Table 16—When Teachers Report Teaching a Standard by Quarter

Elementary	Pacing Guide to Survey Responses			
	Q1	Q2	Q3	Q4
Standard 1	69.88%	49.40%	48.19%	46.99%
Standard 2	38.55%	31.33%	20.48%	15.66%
Standard 3	27.71%	42.17%	19.28%	16.87%
Standard 4	21.69%	33.73%	24.10%	19.28%
Standard 5	14.46%	45.78%	22.89%*	16.87%
Standard 6	13.25%	22.89%	40.96%	15.66%
Standard 7	12.05%	19.28%	39.76%	28.92%
Standard 8	14.46%	12.05%	20.48%	42.17%
Standard 9	19.28%	13.25%	20.48%	15.66%
Standard 10	6.02%	4.82%	7.23%	16.87%
Standard 11	4.82%	6.02%	4.82%	16.87%
Middle School	**Pacing Guide to Survey Responses**			
	Q1	Q2	Q3	Q4
Standard 1	80.00%	45.00%	45.00%	50.00%
Standard 2	85.00%	5.00%	0.00%**	10.00%
Standard 3	65.00%	40.00%	0.00%	10.00%
Standard 4	30.00%	60.00%	15.00%	15.00%
Standard 5	0.00%	60.00%	35.00%	25.00%
Standard 6	0.00%	40.00%	50.00%	35.00%
Standard 7	25.00%	30.00%	45.00%	20.00%
Standard 8	10.00%	5.00%	60.00%	30.00%
Standard 9	15.00%	0.00%	25.00%	55.00%
Standard 10	0.00%	10.00%	5.00%	5.00%

Standard 11	5.00%	5.00%	5.00%	5.00%
High School	**Pacing Guide to Survey Responses**			
	Q1	Q2	Q3	Q4
Standard 1	84.62%	61.54%	61.54%	61.54%
Standard 2	76.92%	50.00%	7.69%	7.69%
Standard 3	65.38%	46.15%	3.85%	3.85%
Standard 4	11.54%	42.31%	15.38%	34.62%
Standard 5	7.69%	65.38%	42.31%	11.54%
Standard 6	3.85%	19.23%	65.38%	15.38%
Standard 7	7.69%	19.23%	65.38%	11.54%
Standard 8	15.38%	15.38%	46.15%	50.00%
Standard 9	0.00%	0.00%	7.69%	26.92%
Standard 10	0.00%	0.00%	3.85%	15.38%
Standard 11	7.69%	0.00%	0.00%	11.54%
Standard 12	7.69%	0.00%	0.00%	7.69%

Note. * Yellow (lighter) highlights indicate when surveyed teachers reported teaching a standard not included in the pacing guide for the quarter. ** Rose (darker) highlighted cells indicate when surveyed teachers reported not teaching standards that were included in the pacing guides.

Discussion. For the most part, teachers report following the pacing guides provided for them by the District. This is true except in the middle school for Standards 2 and 3 in Quarter 3, in which the standards in the pacing guide are omitted. In most cases, teachers report teaching the standards more often than the pacing guides call for.

Feedback. It is encouraging to see there are very few (two to be specific) instances in which teachers are omitting the standards called for in the pacing guide. If, however, teachers are teaching additional standards not called for in the pacing guides, are they overloading units with too much extraneous and unrelated materials?

Alignment of Implemented Curriculum to the District-Developed Assessments

Approach. Using the same survey-forward approach, the next alignment looked to see the degree of alignment of the implemented curriculum to the District-developed assessments.

Methods. Given the alignment of the pacing guides and the assessments, we asked teachers to report the degree to which the implemented curriculum aligned to the assessments. Specifically, we asked teachers how they used the results of the assessments and the degree to which they valued the feedback provided by those assessments—whether they used them formatively to inform future instruction or rather saw them as summative assessments that had little or no instructional value.

Results. The tables below report across all teachers surveyed. Table 17 shares how teachers perceived how the results from the unit assessments are used. Table 18 shares how teachers report using assessment data to inform instruction. Table 19 reports how teachers rated the District-developed assessments on a scale from 1 to 5 where 1 was poor and 5 was excellent.

Table 17—Perception of Unit Assessment Use

How are the results from the Unit Assessments used? Check all that apply.		
They're reported to the District office.	52	40.31%
Results inform classroom instruction.	77	59.69%

Table 18—Teacher Report of Assessment Data

Which data/results do you use to inform science instruction? Check all that apply.		
District-developed assessments	81	62.79%
Self-developed assessments	93	72.09%

Results inform remediation.	94	72.87%	Outside resources or programs	44	34.11%
Results inform instruction.	52	40.31%	Other	3	2.33%
They're not used at all.	14	10.85%			
Other	2	1.55%			

Table 19—Teacher's Rating of District Developed Assessments

How would you rate the District's Unit Assessments? 1 (Poor) - 5 (Excellent) (n=121)		
1	22	18%
2	30	24%
3	40	33%
4	22	18%
5	7	5%
average	2.69	

Discussion. Overall, the District-developed assessments garnered a great deal of attention. Numerically speaking, by the data presented here, one can see teachers reported that they use the assessment data to inform remediation, but that they are more likely to use self-developed assessments to inform instruction. An average rating of unit assessment quality of 2.69 indicates some dissatisfaction with the unit assessments.

Feedback. Teachers across grade-levels and courses shared they found the assessments had errors—both typographical and content. Additionally, teachers reported that although the appreciated that the unit assessments were short and didn't take a lot of instructional time to administer, they were concerned about the validity of the results—that there were too few items to report out with any accuracy what a student actually knows and is able to do by standard. Many teachers pointed out that ten to twenty multiple choice questions missed the depth and breadth of the standards themselves.

Other Survey Data Reported

Approach. Other data gathered in the surveys and focus group discussions included teacher's perception of the quantity and quality of District-provided resources, the amount of time they spent in preparation to teach the science curriculum, the teachers use of instructional data, the instructional strategies they most often used, needed professional development and the presence or absence of remediation, differentiation, and enrichment (see the full responses in Appendix E).

Methods. The methodology described earlier in this study, gathered direct alignment information, but also gathered information that will be useful to District office science personnel as they tailor professional development, hone the curriculum, and further understand the needs of educators across DISTRICT X.

Results. Across all grade-levels and courses, science teachers reported that they felt generally favorable toward the resources and materials provided by the District than they did the District-developed unit assessments. Most teachers reported they spent between 30 minutes and two hours per week in preparation for teaching science. The instructional data they use most often to inform instruction are self-created assessments. Teachers rely primarily on direct instruction. They teach 1-3 hours of science per week at the elementary grades. Across the board they report that they "sometimes" use hands-on instruction. For professional development, they'd like to have more information regarding integrating scientific and engineering practices. On a positive note, most felt prepared for 2018 standards. Generally, teachers report they had a more favorable perception of the quality of the science resources and materials provided by the District. The most oft used resource is Brain Pop and other outside resources (by far outweighing any other District developed resource).

additional resources for enrichment.

Discussion. Within the Other data category, at least one theme emerged. The teachers express a lack of confidence in their instruction aligning to the District-developed assessment. The issues with the District assessments may be eroding teachers' and students' confidence in the quality of instruction and assessment methods used. Overall, however, they appreciated the ability to access resources like Brain Pop, but felt a need for more resources that are engaging, hands-on and ready to implement.

Overall Survey and Focus Group Feedback.
Based on the anonymous surveys and focus group interviews, educators at DISTRICT X offered the following feedback:

Administrators

The administrators' anonymous surveys highlighted the positive aspects of strong collaboration among teachers and the District's efforts to provide resources and opportunities for growth. However, they reported some teachers struggle completing the curriculum, and may lack a deep understanding of science concepts, planning lessons, and implementing student-centered learning experiences. They expressed the need for additional training on scientific processes, inquiry, and problem-based learning to address these challenges and improve instruction.

Elementary

Teachers expressed concerns about the STEMscopes program. Feedback indicated some teachers believed the STEMscopes materials themselves are not reader-friendly. Also reported, some grade levels received the necessary science teaching and learning supplies, while others had to purchase them. Teachers voiced frustration with the program's limitations and found previous instructional resources more effective.

Assessments provided by the District, including unit tests and alternative projects, generated mixed opinions. Some teachers believe the tests are too wordy or not aligned with students' background knowledge. The length and clarity of the assessments were an area of concern. There were varying views on the effectiveness and fairness of the District's assessments.

Teachers noticed a decline in curriculum support and professional development resources from the District in the last couple of years—likely a result of COVID. New teachers or those transitioning to different grade levels expressed they'd like additional support and resources. Teachers suggested improvements in pacing guides and additional materials and resources for differentiation and real-world application.
Elementary teachers reported that while the pacing guides provide time at the end of the year for remediation, that time might be better placed interspersed throughout the year.

The teachers expressed some frustration with the District's testing and assessments, citing misspellings and inconsistencies in the questions. Consequently, they created their own assessments to ensure students' comprehension of the material.

Middle School

According to Middle School teachers, the current curriculum pacing guide was too cognitively demanding, leading to a lack of time to reach mastery, particularly for students with special needs. Additionally, the curriculum guides were complicated.

Some teachers also reported that the storage and equipment room conditions were in need of attention, making it challenging to access and equipment, which can affect the quality of instruction and safety of students. Some also reported that they didn't receive materials until the school year had started or closer to mid-year.

Regarding the District-developed assessments, middle school teachers reported that the unit assessments appeared to be overly complex, testing students on non-science related vocabulary and

on the 8th grade District unit tests seemed to be overwhelming for teachers, making it difficult to master the material in the given time frame. According to the teachers, there are simply too many standards to teach in one year.

High School

High school teachers provided some pointed feedback. Some common themes included the pacing of the curriculum, difficulties with creating and finding resources for instruction, and issues with the District assessments. Additionally, there were concerns about students struggling to keep up with the tempo of the pacing guides and the need for more opportunities for in-depth understanding, practice, and application of concepts. They too requested that remediation and intervention time should be spread throughout the year.

Teachers expressed that both the structure of the pacing guide and the content of the Standards contribute to their challenges. The pacing guide sets a fast pace for covering the material, regardless of the students' level of understanding. Additionally, the sequencing of topics in the pacing guides, such as starting with cytology instead of biochemistry, may not align well with the actual content emphasized in the STATE tests.

Teachers mentioned that co-taught classes and special education students are particularly affected by the quick pacing, with some students falling behind. The District assessments were also a source of frustration, as they may not accurately reflect student mastery.

According to teachers, in order to address these concerns, the District should consider revising the pacing guide to allow for more time for review, remediation, and hands-on activities, as well as provide more training and resources for teachers to create effective instructional materials and assessments. They also suggested it may be helpful to provide teachers the District-developed assessments earlier so they can prepare their lessons to better align with the assessment (backward design). Additionally, they asked for the assessments to be free of errors and accurately reflect the required practices and skills stated in the curriculum.

TASK 4—FINDINGS AND RECOMMENDATIONS

Based on the findings from the audit, we identified areas of strengths and potential improvement in the curriculum, assessment, and instructional methodology. We developed actionable recommendations to address the identified issues and enhance the curriculum's effectiveness.

The recommendations provided are organized by the three major strands of curriculum—written, assessed, and implemented—and professional development. The suggestions are shared with you in order that you may create an action plan with specific steps, responsible parties, and timelines for implementation.

Curricular Findings

Findings.

- Teachers across all grade spans expressed gratitude for the pacing guides and materials. Additionally, they recognized that just as the buildings where they teach are short staffed, so is the science department at the District Office. Multiple teachers and administrators mentioned how they appreciate the efforts and the accessibility of District Office personnel.
- Analysis of the pacing guides and curricular materials revealed an occasional non-alignment (Table 6).
- The alignment of the curriculum (District provided materials and resources) to the Standards had a strong alignment across most grades and courses. A notable exception occurs in grades 1 and 2 which have an integrated format (Table 4). Content experts noted the alignment of the Standards to the curriculum in grades 1 and 2 may be more strongly aligned to a math or English standard than to the science. The marked difference in the format and structure of grades 1 and 2 makes vertical alignment and articulation difficult for staff members.

means they may not effectively distribute the curriculum content over the designated time frame. This could lead to rushed or insufficient instruction.

- There are lessons that are exact replicas from one year to the next. Although this may be review material for students, varying the activity or teaching strategy may be helpful to students who did not master the standard in the prior year.

District-Developed Assessment Findings

Findings.

- Teachers and administrators noted that District-developed unit assessments contain some errors, which can undermine validity. These errors, both in content and typographical (such as misspellings), can make it difficult to accurately gauge student mastery of a standard.
- The assessments are administered once per unit in grades 3 through Biology (except in 5th grade where there is also a pre-test in each unit). Typically, educational assessments require at least six items as the minimum for an assessment scale to measure content knowledge related to a standard and for basing decisions about students' knowledge of that standard (Webb, 1999). There are some Standards that have fewer than six assessment items measuring them (Table 9).
- Overall, the items on the unit assessments were fully or partially aligned across all domains of the Standards with very few exceptions (Table 7).
- Only 10.3% items were designated by a DOK 3 rating were designated on the DISTRICT X Unit Assessments (Table 8) with a higher concentration of DOK 3 items at grades 5, 6, and Biology. More Level 3 items could be developed to balance the distribution of DOK by grade as is designated by the STANDARD.
- The assessments use items that are exact replicas from a previous unit's test—students may remember an item. While a student will likely experience this item a year prior, there's a missed opportunity to measure if a student's understanding of the standard has grown.
- Overall, the assessments are well-aligned to the pacing guides. The Biology assessment to pacing guide alignment is particularly strong.
- Teachers expressed multiple times that they were unsure how to use the data from the District assessments, relying instead on self-created assessments (Table 18).

Instructional Findings

Findings.

- Some Teachers indicated they relied on personal funds to provide hands-on and lab experiences for their students. Some reported they searched Pinterest and Teachers-Pay-Teachers for turnkey activities which may or may not actually align to the STATE Standards. Some teachers indicated their first concern was student engagement—Standards and DOK were secondary concerns.
- According to teachers, there appears to be inconsistency in the availability of materials, texts, and directions across different grades, which can impact instructional continuity and coherence. Some teachers reported that they did not receive instructional materials until late fall or winter.
- Most teachers felt mostly prepared for the 2018 rollout of the new science Standards. Some teachers expressed concern for the preparedness of early-career teachers or teachers teaching outside their certified area.
- In the STATE Science Standards, standard 1 is foundational across all grades and courses. In this standard, students in grades Kindergarten through high school must demonstrate an understanding of scientific and engineering practices. Data overwhelmingly indicates that DISTRICT X teachers are teaching Standard 1 (Table 16).
- For the most part, teachers report following the pacing guides provided to them by the District Office (Table 16).
- Of the materials and resources available to them, teachers indicated that external shelf products like Brain Pop or unvetted materials like those on Teachers-Pay-Teachers were the most

Standards.

Recommendations.
This list of recommendations is provided for you to consider. To take the next step, discuss these suggestions with relevant stakeholders, such as administrators, curriculum coordinators, and fellow educators, to explore potential solutions and improvements. They can be implemented once an action plan has been created plan with specific steps, responsible parties, and timelines for implementation.

Curriculum Recommendations:

- As the pacing guides and units of study are reorganized, conduct professional development to support teachers in addressing pacing guides and increase content knowledge.
- As the curricular materials and pacing guides are tweaked, ensure that the curriculum coverage aligns with the assessment expectations.
- Currently the pacing guides allocate time for remediation at the end of the year—which may be less than helpful if students need interventions nearer the beginning of the year. Evaluate the pacing of units providing opportunity to remediate throughout the year.
- When revising curriculum, narrow the focus to include only those resources you know align to the standards and learning goals.
- While the pacing guides and other curricular materials mention remediation—there is little to no discussion of differentiation or enrichment. Teachers have requested specific and targeted approaches to addressing these needs.
- Use teachers and science staff to conduct a review of curriculum and vertical articulation. Teachers expressed an interest in being involved in the process.
- For those lessons that are a review across grades, create new activities. Teachers shared that student remembered repeated activities from year to year.
- As the pacing guides and curricular materials and resources are revisited, look to create more opportunities to teach to a cognitive complexity DOK of 3 or 4 across all grade levels and courses.

Assessment Recommendations:

- Consider revising assessments to reflect the depth and breadth of the standards. Ensure all elements of the Standards are addressed and that the Standards are measured at an appropriate DOK.
- Edit assessments for clarity, content, and typographical errors.
- Consider how assessment data is used. Given the limited number of items assessed in the unit assessment, it's not viable to use them as a full measure of what students know and are able to do.
- When pre-testing or reviewing standards, consider writing items that measure the student's knowledge, refrain from reusing or repeating items.
- Increase DOK of assessment items. Nearly every item in the unit assessment item bank is multiple choice; consider other measures of student's knowledge.
- Examine the number of assessment-to-pacing guide non-alignments in quarter 4 (this may be resolved by moving remediation activities to other parts of the year).

Instructional Recommendations:

- Provide teachers with opportunities to learn and explore a variety of student engagement strategies. Teachers can learn and practice instructional strategies such as cooperative learning, and interactive discussions to promote active participation, collaboration, and critical thinking in the classroom.
- Offer teachers opportunities to learn strategies and resources for incorporating more hands- on activities and labs into the curriculum. Teachers see the value in hands-on learning but would like more ready-to-roll engaging materials.

implementing engaging experiments and investigations that promote student participation, critical thinking, and understanding of scientific concepts.

- Address the variability in resource acquisition. Teachers expressed that they experienced differences in when and if they received manipulatives and other resources, which could lead to inequities in the learning experiences provided to students.
- Evaluate the resources provided to teachers. Evaluate the resources (both internal and external) that teachers use for effectiveness and alignment to the standards. There are a lot of resources provided to teachers, so many that the approach to integrating them is scattered.
- Consider tying teacher evaluation to the use of the curriculum and where they are teaching relative to the pacing guides. If the pacing guides are a valuable piece of the validity of how instruction is taught across the District, include it as one component of the teacher's accountability.
- Invest in University Teachers. Teachers spoke very highly of this team of support people.

Professional Development Recommendations:

- Offer professional development sessions that provide teachers training on writing clear learning objectives and developing cohesive lesson plans. Teachers can learn effective techniques for articulating learning targets, aligning instructional activities with objectives, and assessing student progress towards those targets.
- Offer professional development on data analysis and interpretation to support the teachers' use of student data effectively. Teachers may explore how to analyze assessment results, identify areas of need, and use the data to inform instructional decisions and differentiate instruction to meet individual student needs.
- Include professional development on what DOK 3 or 4 instruction looks like and how one might achieve that meaningfully in the classroom.
- Provide training on developing classroom assessments that align with the curriculum and standards, focusing on clear and concise question writing, accurate representation of content, and appropriate depth of knowledge.

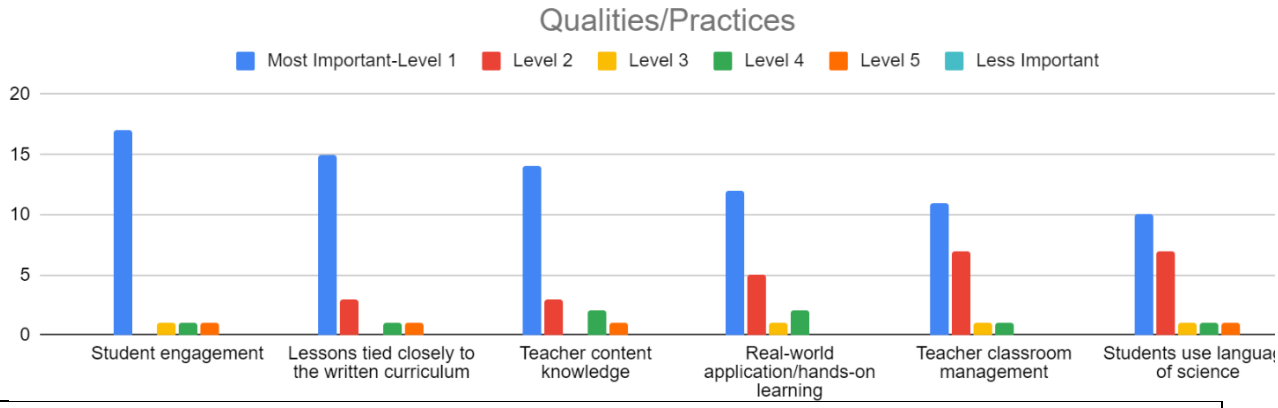
APPENDIX E: SURVEY DATA

Administrator Survey Feedback—charts and graphs

Hands-on Science Experiments		
Often	7	33.33%
Sometimes	10	47.62%
Rarely	4	19.05%
Never	0	0.00%

How are the results from the Unit Assessments used? Check all that apply.		
They're reported to the District office.	7	33.33%
Results inform classroom instruction.	14	66.67%
Results inform remediation.	18	85.71%

Results inform enrichment.	3	14.29%
They're not used at all.	0	0.00%



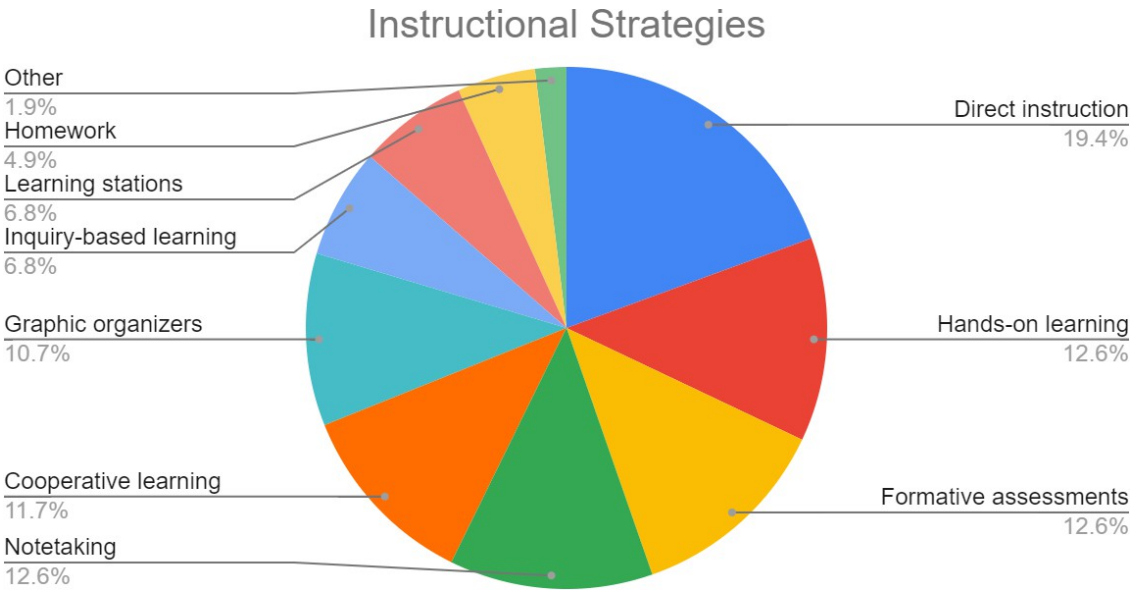
Do the resources and curriculum you use provide for differentiation, remediation, and enrichment? Check all that apply.		
Differentiation	13	61.90%
Remediation	15	71.43%
Enrichment	9	42.86%
None of the above	3	14.29%

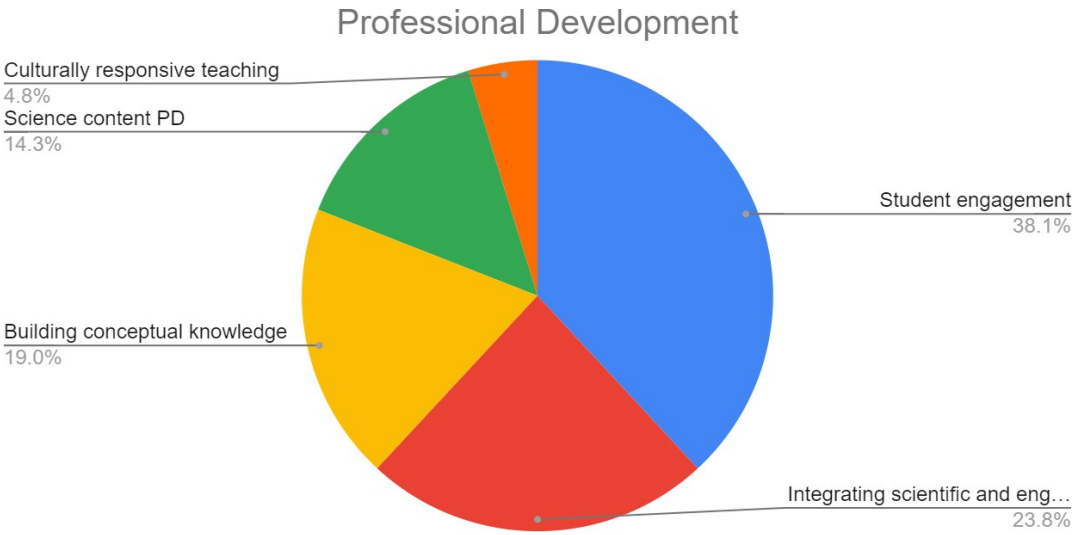
Which data/results do you use to inform science instruction? Check all that apply.		
District-developed assessments	19	90.48%
Self-developed assessments	8	38.10%
Outside resources or programs	6	28.57%

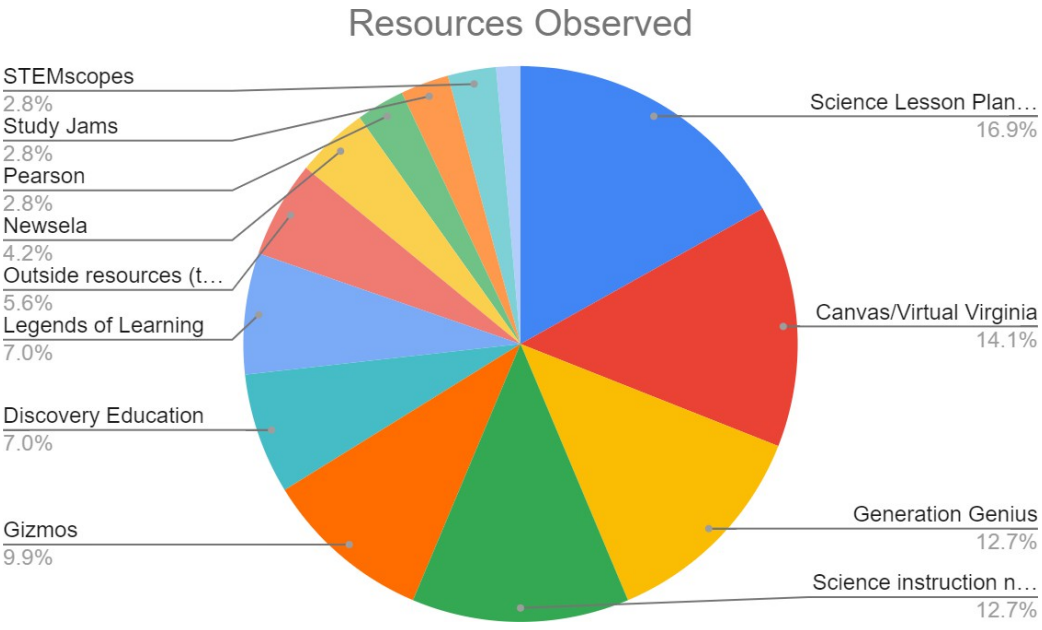
Mastery level teaching		
All	0	0.00%
Most	13	65.00%
Few	7	35.00%
None	0	0.00%

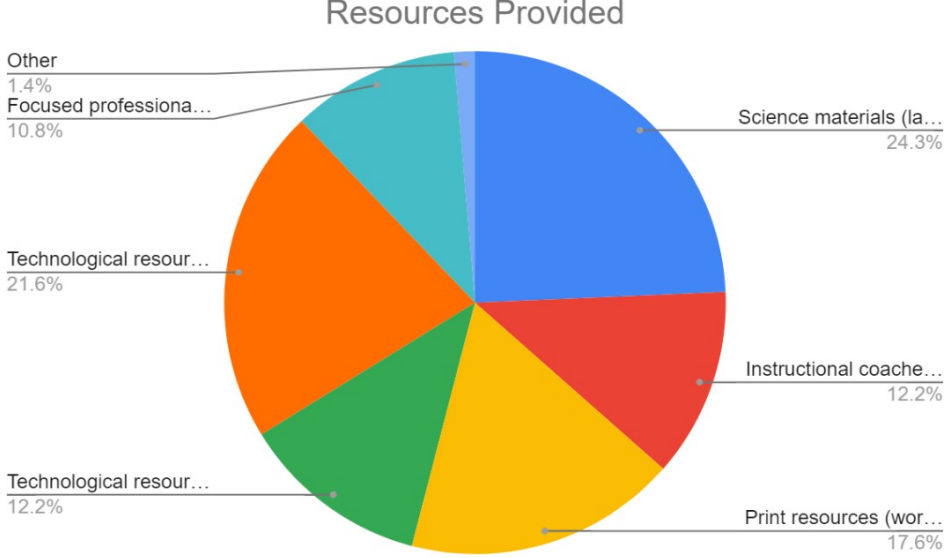
DOK		
Mostly DOK 1		5.00%
Mostly DOK 1 and 2		35.00%
Mostly DOK 2		15.00%
Mostly DOK 2 and 3		25.00%
Mostly DOK 3		10.00%
Mostly DOK 3 and 4		10.00%

Mostly DOK 4		0.00 %





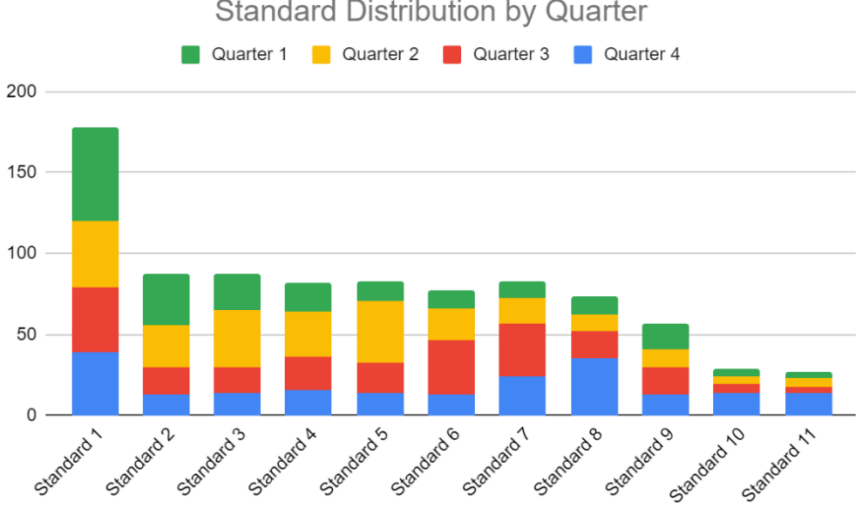




How would you rate the District's science pacing guides? 1 (Poor) - 5 (Excellent) (n=21)	
1	0
2	1
3	9
4	11
5	0
Average Rating	3.48

How would you rate the quality of resources available to you to teach science? 1 (Not high quality) - 5 (Excellent quality) (n=21)	
1	0
2	2
3	7
4	10
5	2
Average Rating	3.57

How would you rate the quantity of the resources available to you to teach science? 1 (Not nearly enough) - 5 (More than could ever be used) (n=20)	
1	0
2	3
3	3
4	11
5	3
Average Rating	3.70



On average, how much time do you spend teaching science per week?		
fewer than 30 minutes	6	7.23%
30 minutes to 1 hour	6	7.23%
1-3 hours	50	60.24%
4-5 hours	12	14.46%
more than 5 hours	5	6.02%
Other	4	4.82%

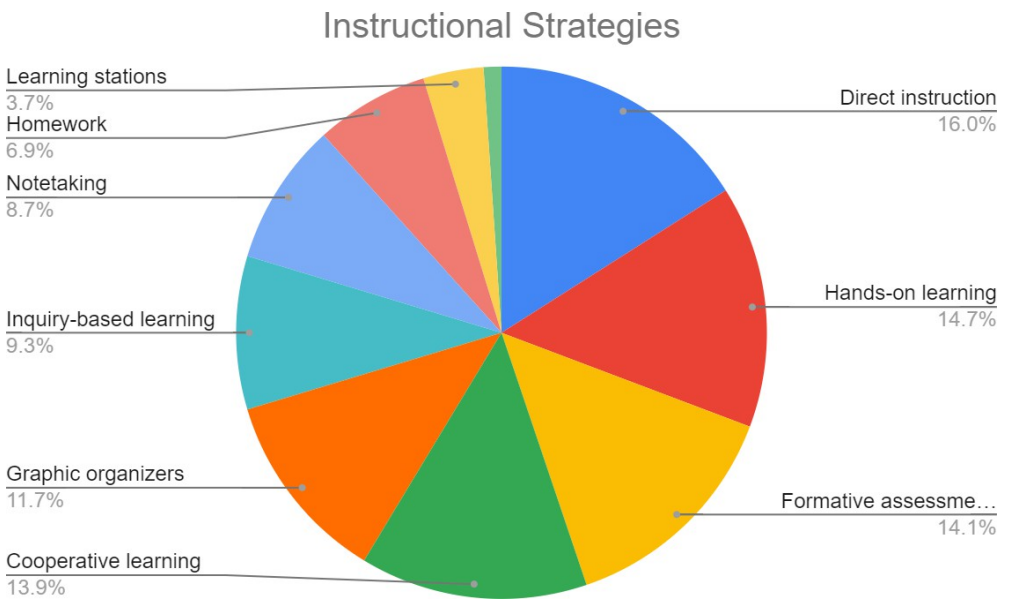
How much time per week do you spend planning in order to teach science?		
fewer than 30 minutes	7	8.43%
30 minutes to 1 hour	26	31.33%
1-2 hours	31	37.35%
3-4 hours	14	16.87%
More than 4 hours	4	4.82%
Other	1	1.20%

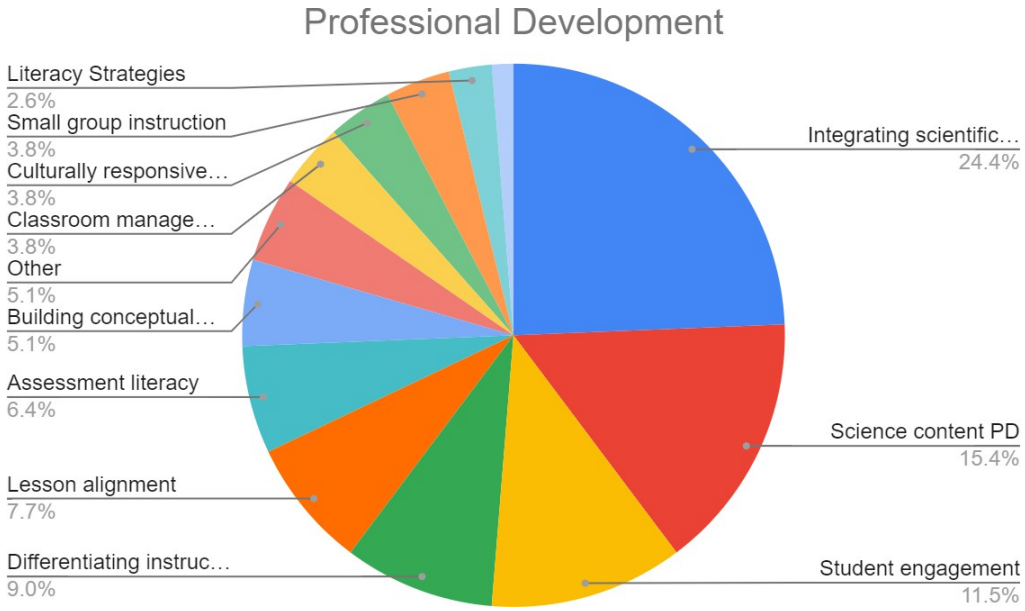
Mastery level teaching		
All	11	13.25%
Most	49	59.04%
Few	21	25.30%
None	2	2.41%

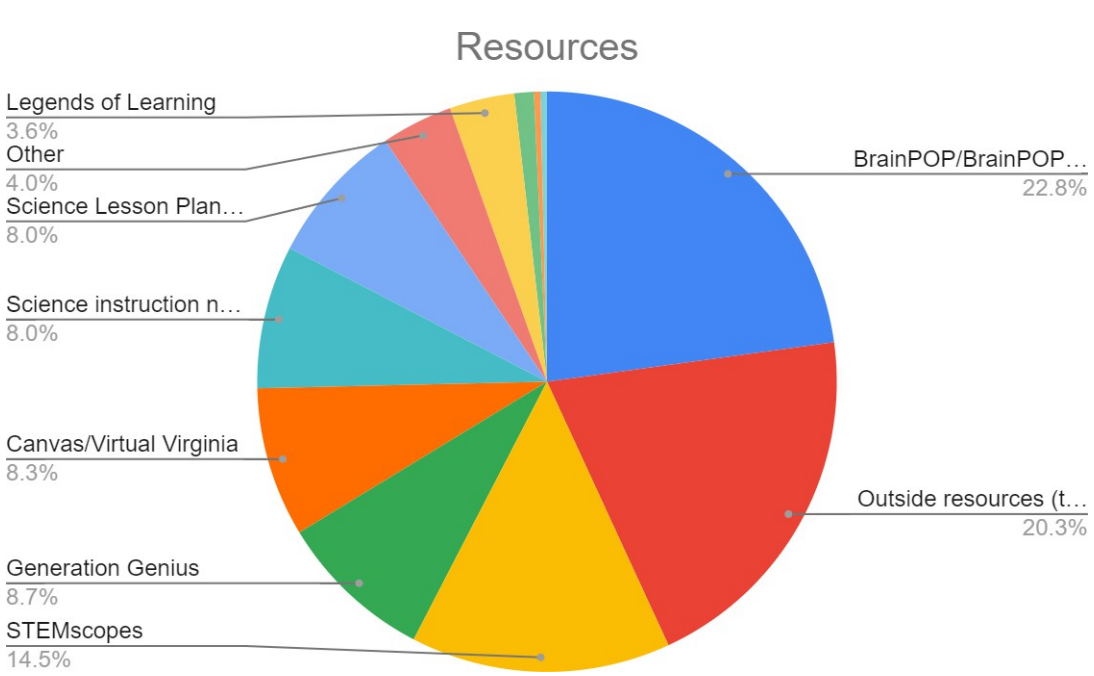
DOK		
Mostly DOK 1		6.02%
Mostly DOK 1 and 2		25.30%
Mostly DOK 2		8.43%

Mostly DOK 2 and 3		22.89%
Mostly DOK 3		7.23%
Mostly DOK 3 and 4		13.25%
Mostly DOK 4		2.41%
Other		14.46%

Hands-on Science Experiments		
Often	23	27.71%
Sometimes	45	54.22%
Rarely	15	18.07%
Never	0	0.00%







How would you rate the District's science pacing guides? 1 (Poor) - 5 (Excellent) (n=83)	
1	7
2	14
3	31
4	24
5	7
Average Rating	3.12

How would you rate the District's Unit Assessments? 1 (Poor) - 5 (Excellent) (n=79)	
1	11
2	16
3	29
4	19
5	4
Average Rating	2.9

How would you rate the quality of resources available to you to teach science? 1 (Not high quality) - 5 (Excellent quality) (n=83)	
1	8
2	21
3	25
4	19
5	10
Average Rating	3.02

How would you rate the quantity of the resources available to you to teach science? 1 (Not nearly enough) - 5 (More than could ever be used) (n=83)	
1	14

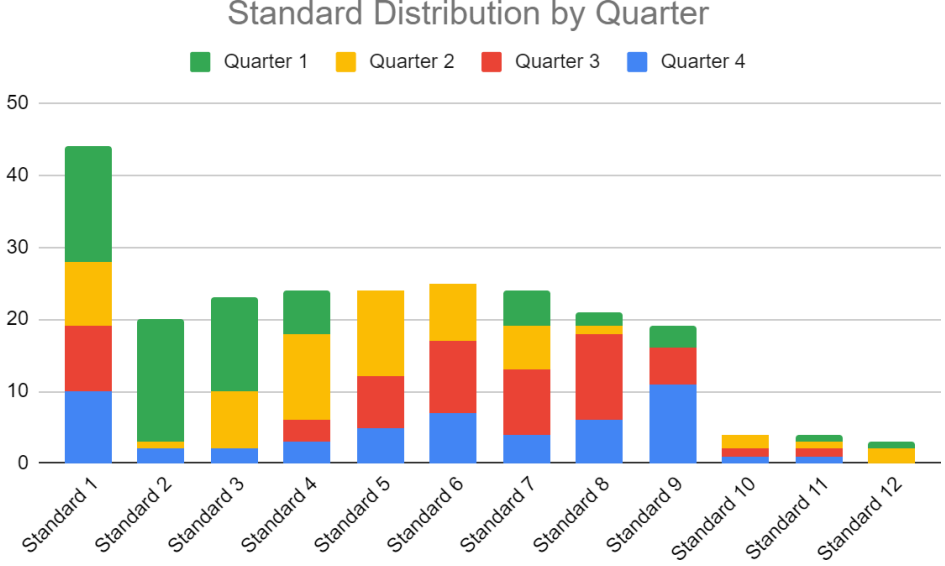
2	24
3	19
4	16
5	10
Average Rating	2.81

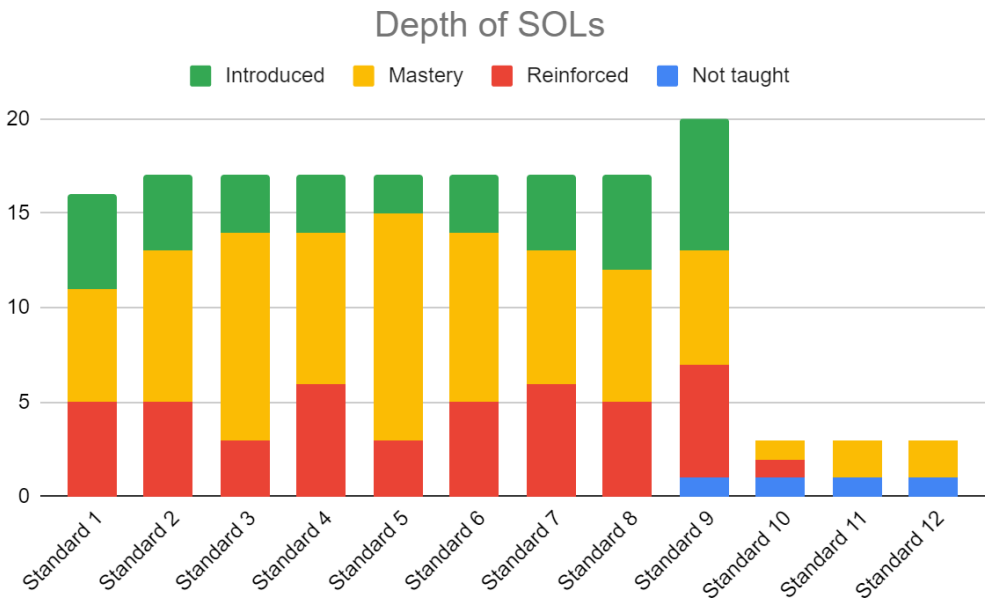
With the roll-out of the 2018 Standards and new curriculum, how prepared were you to teach the new curriculum?		
Very prepared	19	22.89%
Mostly prepared	48	57.83%
Not prepared at all	15	18.07%

How are the results from the Unit Assessments used? Check all that apply.		
They're reported to the District office.	27	32.53%
Results inform classroom instruction.	51	61.45%
Results inform remediation.	54	65.06%
Results inform enrichment.	30	36.14%
They're not used at all.	11	13.25%

Do the resources and curriculum you use provide for differentiation, remediation, and enrichment? Check all that apply.		
Differentiation	45	54.22%
Remediation	43	51.81%
Enrichment	47	56.63%
None of the above	17	20.48%

Which data/results do you use to inform science instruction? Check all that apply.		
District-developed assessments	54	65.06%
Self-developed assessments	55	66.27%
Outside resources or programs	29	34.94%



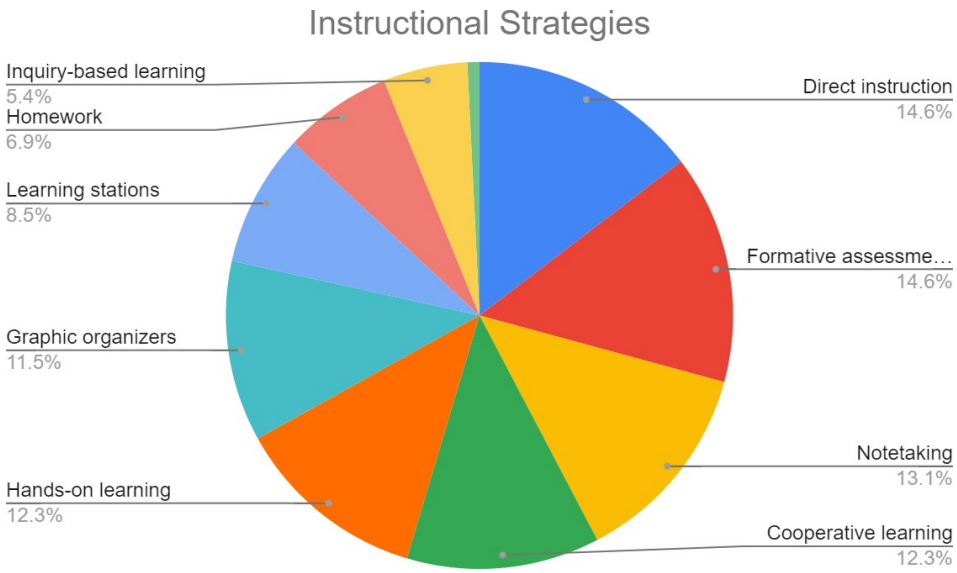


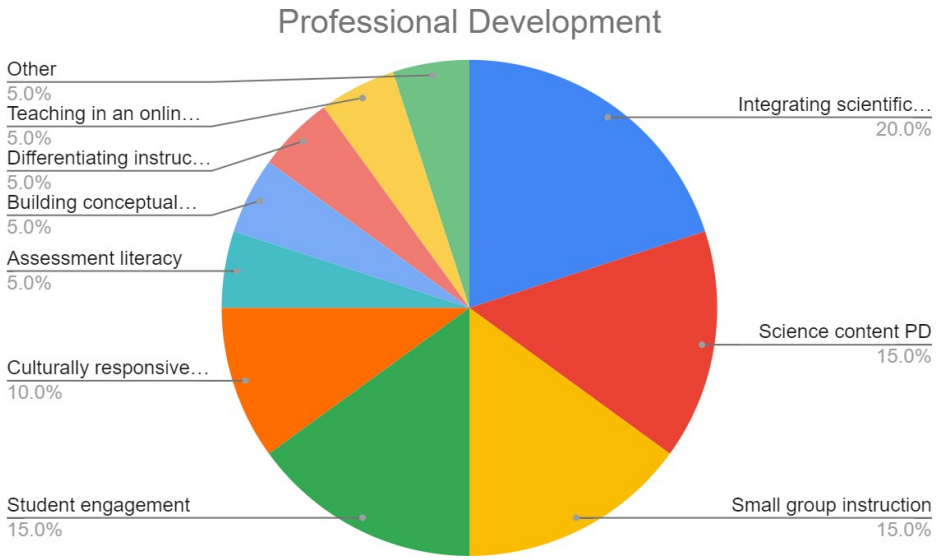
Mastery level teaching		
All		25.00%
Most		35.00%
Few		30.00%
None		10.00%

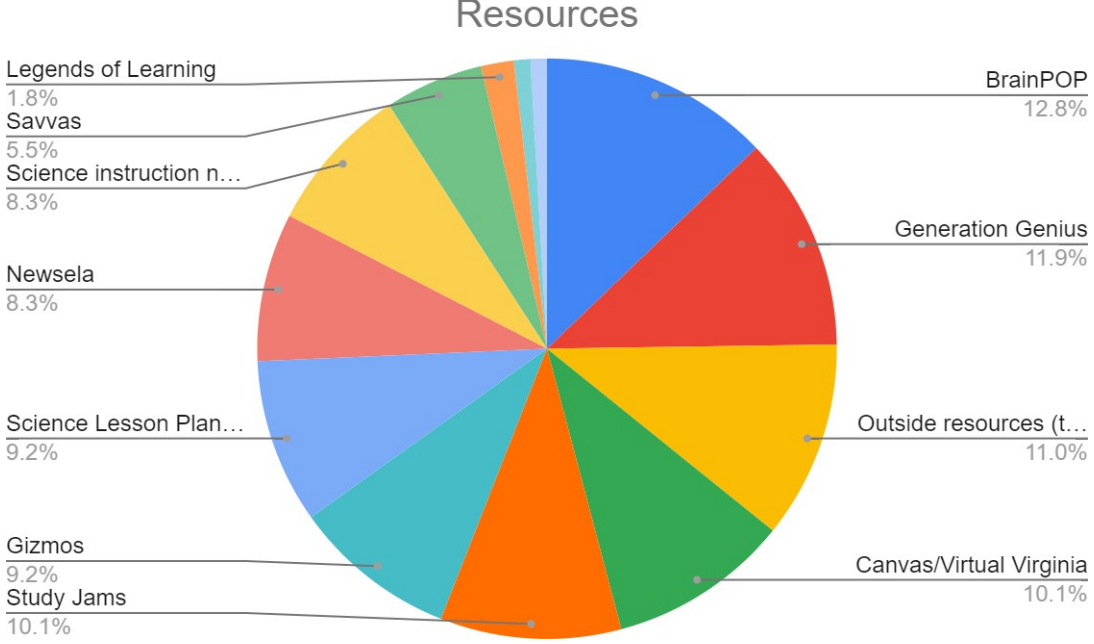
DOK		
Mostly DOK 1		10.00%
Mostly DOK 1 and 2		5.00 %
Mostly DOK 2		5.00 %
Mostly DOK 2 and 3		30.00%
Mostly DOK 3		0.00 %

Mostly DOK 3 and 4		30.00%
Mostly DOK 4		5.00%
Other		15.00%

Hands-on Science Experiments		
Often	8	40.00%
Sometimes	10	50.00%
Rarely	2	10.00%
Never	0	0.00%







How would you rate the District's science pacing guides? 1 (Poor) - 5 (Excellent) (n=20)	
1	4
2	7
3	7
4	1
5	1
Average Rating	2.4

How would you rate the District's Unit Assessments? 1 (Poor) - 5 (Excellent) (n=19)	
1	6
2	9
3	3
4	0
5	1
Average Rating	2.0

How would you rate the quality of resources available to you to teach science? 1 (Poor) - 5 (Excellent) (n=20)	
1	1
2	2
3	12
4	4
5	1
Average Rating	3.1

How would you rate the quantity of the resources available to you to teach science? 1 (Poor) - 5 (Excellent) (n=20)	
1	4

2	2
3	9
4	3
5	2
Average Rating	2.85

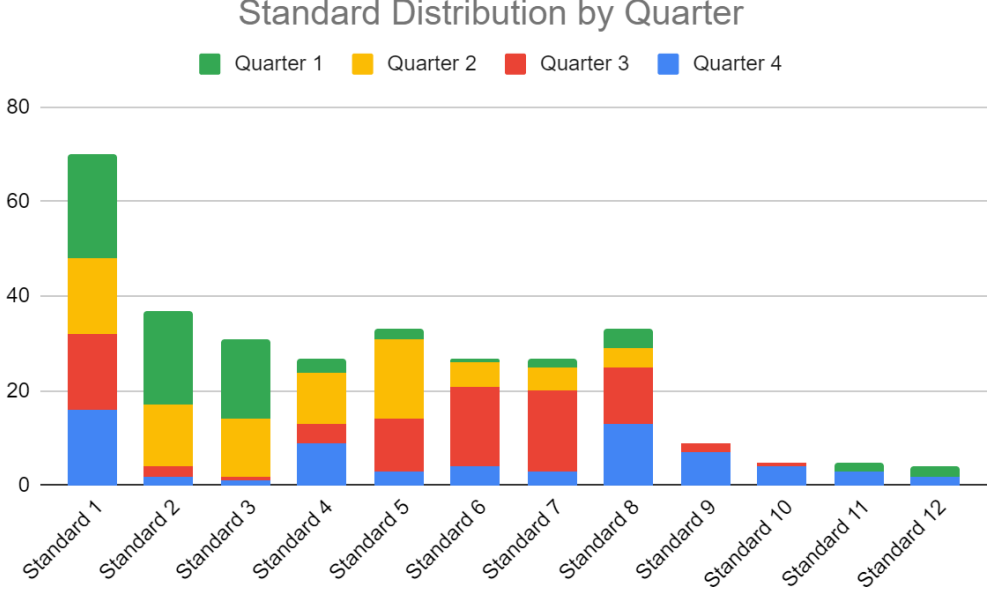
With the roll-out of the 2018 Standards and new curriculum, how prepared were you to teach the new curriculum?		
Very prepared	4	20.00%
Mostly prepared	14	70.00%
Not prepared at all	2	10.00%

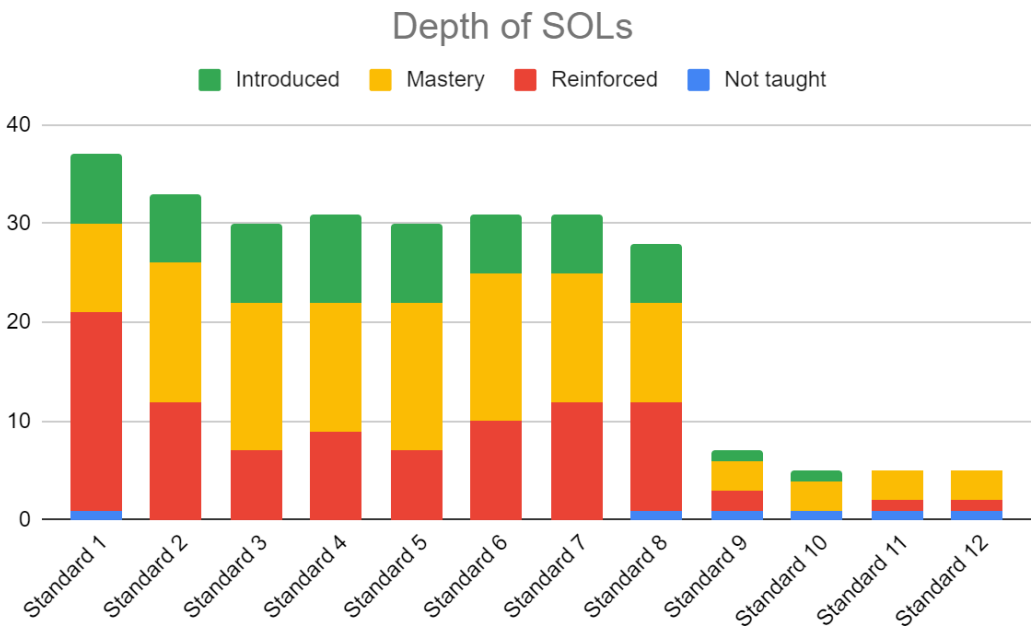
How are the results from the Unit Assessments used? Check all that apply.		
They're reported to the District office.	10	50.00%
Results inform classroom instruction.	8	40.00%
Results inform remediation.	16	80.00%
Results inform enrichment.	5	25.00%
They're not used at all.	3	15.00%

Do the resources and curriculum you use provide for differentiation, remediation, and enrichment? Check all that apply.		
Differentiation	13	65.00%
Remediation	14	70.00%
Enrichment	10	50.00%
None of the above	5	25.00%

Which data/results do you use to inform science instruction? Check all that apply.		
District-developed assessments	11	55.00%
Self-developed assessments	13	65.00%
Outside resources or programs	5	25.00%
Other: Formative Assessment	2	10.00%

High School Teacher Survey Feedback—charts and graphs



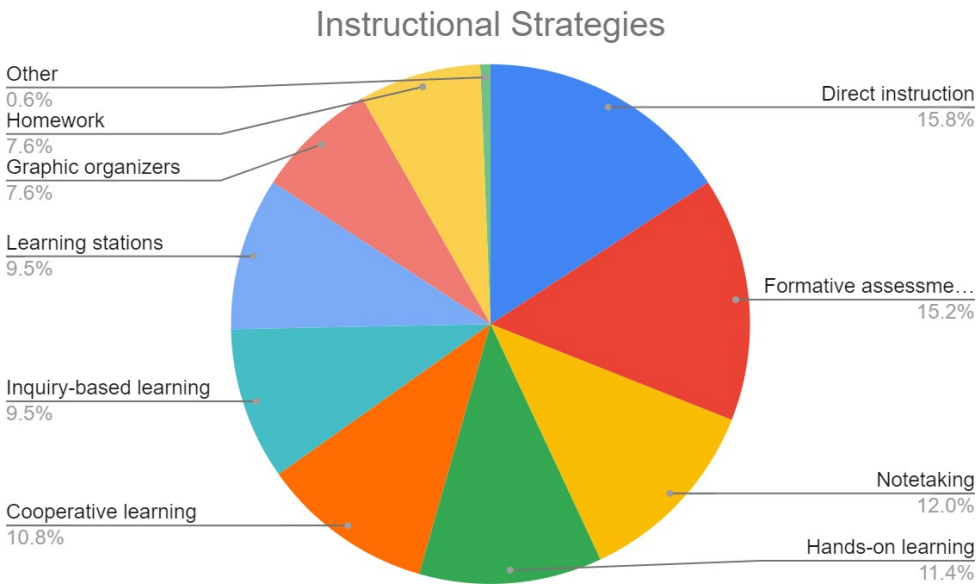


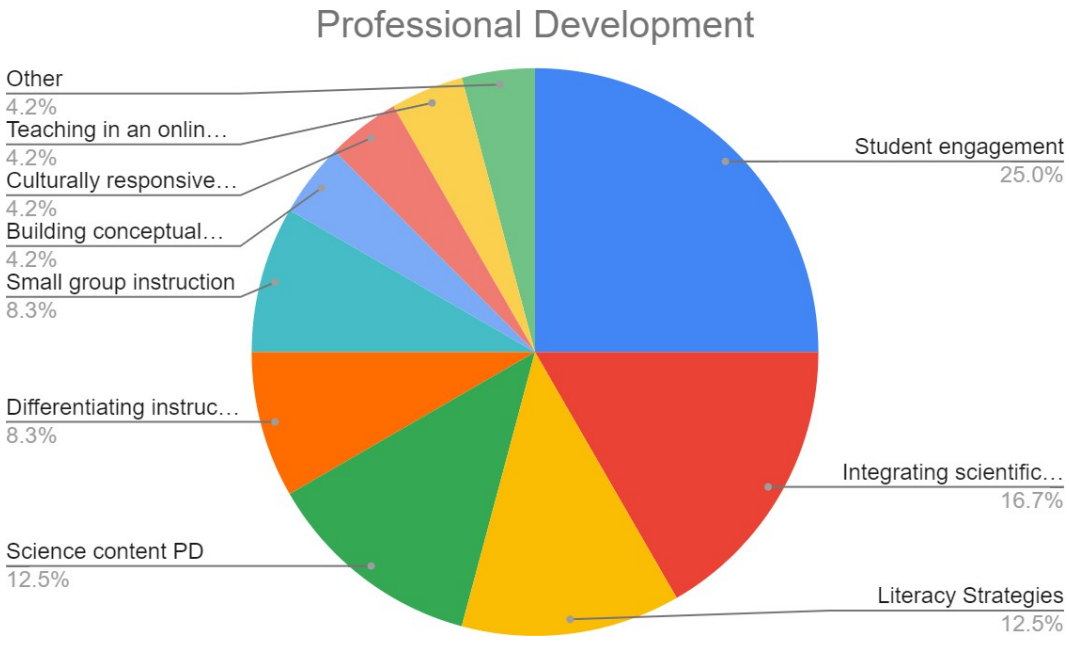
Mastery level teaching		
All	9	36.00 %
Most	13	52.00 %
Few	1	4.00%
None	2	8.00%

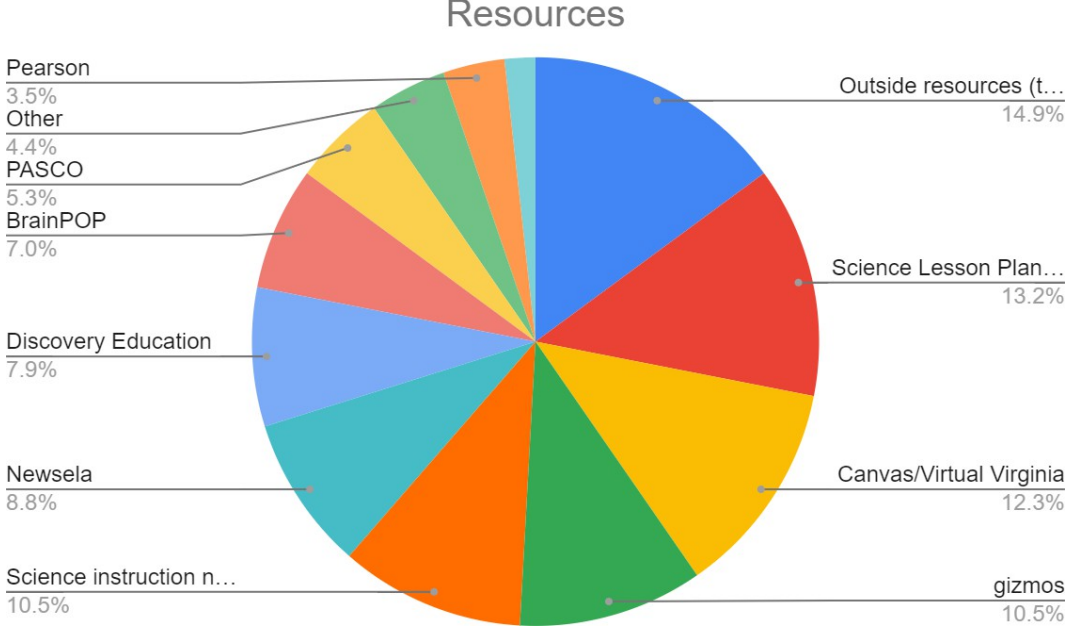
DOK		
Mostly DOK 1		0.00 %
Mostly DOK 1 and 2		7.69 %
Mostly DOK 2		3.85 %
Mostly DOK 2 and 3		42.31%

Mostly DOK 3		3.85 %
Mostly DOK 3 and 4		15.38%
Mostly DOK 4		3.85 %
Other		23.08%

Hands-on Science Experiments		
Often	9	34.62%
Sometimes	12	46.15%
Rarely	4	15.38%
Never	1	3.85%







How would you rate the District's science pacing guides? 1 (Poor) - 5 (Excellent) (n=26)	
1	2
2	5
3	10
4	5
5	4
Average Rating	3.15

How would you rate the District's Unit Assessments? 1 (Poor) - 5 (Excellent) (n=23)	
1	5
2	5
3	8
4	3
5	2
Average Rating	2.7

How would you rate the quality of resources available to you to teach science? 1 (Poor) - 5 (Excellent) (n=25)	
1	1
2	3
3	11
4	4
5	6
Average Rating	3.44

How would you rate the quantity of the resources available to you to teach science? 1 (Poor) - 5 (Excellent) (n=26)	
1	2
2	3

3	9
4	8
5	4
Average Rating	3.35

With the roll-out of the 2018 Standards and new curriculum, how prepared were you to teach the new curriculum?		
Very prepared	8	30.77%
Mostly prepared	10	38.46%
Not prepared at all	2	7.69%
Other/Not Applicable	6	23.08%

How are the results from the Unit Assessments used? Check all that apply.		
They're reported to the District office.	15	57.69%
Results inform classroom instruction.	18	69.23%
Results inform remediation.	24	92.31%
Results inform instruction.	17	65.38%
They're not used at all.	0	0.00%
Other	2	7.69%

Do the resources and curriculum you use provide for differentiation, remediation, and enrichment? Check all that apply.		
Differentiation	18	69.23%
Remediation	18	69.23%
Enrichment	17	65.38%
None of the above	2	7.69%

Which data/results do you use to inform science instruction? Check all that apply.		
District-developed assessments	16	61.54%
Self-developed assessments	25	96.15%
Outside resources or programs	10	38.46%
Other	1	3.85%