UPDATE ON REVIEW OF SCIENCE CURRICULUM MATERIALS

SUMMARY OF POLICY ISSUE/STATE BOARD OF EDUCATION (SBE) STRATEGIC PLAN GOALS

The SBE's goal of improving student preparation for postsecondary education and the 21st century world of work and citizenship has focused its attention on key subject areas such as math and science. In addition to developing math and science action plans, the SBE has been engaged in an ongoing review of science standards and curriculum materials.

BACKGROUND

The Legislature asked the SBE to review and make recommendations on the science standards, receive the revised standards from the Office of Superintendent of Public Instruction (OSPI), and provide official comment and recommendations to OSPI regarding science curricula that OSPI recommends to align with the revised standards.[1]

The SBE recommended changes to the science standards in May 2008, based on a review by its consultant, David Heil & Associates, Inc., and the Science Standards Advisory Panel. The OSPI revised the standards and sent them to the SBE on December 1, 2008. The SBE convened a special meeting[2] to receive the revised science standards from OSPI and to accept the Heil report on the revised standards.

OSPI was charged by the Legislature to recommend "…no more than three basic science curricula each for elementary and middle school grade spans, and not more than three recommendations for each of the major high school courses within the following science domains: earth and space science, physical science, and life science."[3] On June 30, 2009, OSPI submitted its initial recommendations regarding the science curricula to the SBE. The SBE has 60 days to provide official comment and recommendations to OSPI.

Throughout the review of standards and curriculum materials, a 19-member Science Standards Advisory Panel, formed by the SBE, has met seven times to provide critical feedback on content and process. In addition, two members of the panel served as part of OSPI's curriculum materials review team.

[1] RCW 28A.305.215
[2] December 10, 2008
[3] ESSB 5414, Section 5 (7) (c-f)

POLICY CONSIDERATION

In Superintendent Dorn's transmittal letter to the SBE (see appendix A), he provides his initial curricula recommendations, and asks for guidance from the Board and the Science Standards Advisory Panel, "with particular interest in…comments regarding the elementary programs and the integrated programs."

None of the six elementary programs reviewed met the minimum composite score of .70, established for eligibility for consideration in the initial recommendations. For this reason, Superintendent Dorn did not make any initial recommendations for the elementary level.

Of the two Integrated Science programs Superintendent Dorn recommended, one of them, "Coordinated Science," does not address one of the three "domain standards." The domains are: 1) physical science, 2) life science, and 3) earth and space science. Coordinated Science does not have a life science component. Despite this omission, Coordinated Science still attained a composite score that met the preset standard for consideration among initial recommendations. Superintendent Dorn is asking for feedback on this recommendation.

OSPI staff, and the consultant hired to lead the curriculum review, will provide the Board with an overview of the process and recommendations.

Official comment and recommendations. To help the SBE fulfill its responsibility to provide official comment and recommendations, staff will call upon the expertise of the Science Standards Advisory Panel. The SBE asked for, but did not receive, funding to hire an external consultant to provide a more comprehensive review. The Panel has provided significant feedback to the curriculum review process by e-mail and teleconference, but in order to fulfill this final task, a face-to-face meeting of the Panel has been scheduled for August 7, 2009. A special meeting of the SBE is scheduled for August 25, 2009 to consider the Panel's feedback, The legislation requires SBE to provide OSPI with recommendations by September 1, 2009.

The first, summative section of the Preliminary Report is included in appendix B.

EXPECTED ACTION

No action will be taken.

SUPERINTENDENT OF PUBLIC INSTRUCTION

Randy I. Dorn Old Capitol Building · PO BOX 47200 · Olympia, WA 98504-7200 · http://www.k12.wa.us

June 30, 2009

Edie Harding, Executive Director
State Board of Education
Old Capitol Building
Olympia, WA 98504

Dear Ms. Harding and Members of the State Board of Education:

During the 2007 legislative session, the state Legislature directed the Office of Superintendent of Public Instruction (OSPI) to revise the state's K-12 Science Standards and to make recommendations of no more than three basic science curricula for elementary, middle and high school that align with the revised standards. The 2009 Legislature refined the timeline and requirement for the science curricula recommendations as part of ESSB 5414, Section 5 (7)(c-f) directing OSPI to make recommendations to the State Board of Education (SBE) by June 30, 2009 of "…no more than three basic science curricula each for elementary and middle school grade spans, and not more than three recommendations for each of the major high school courses within the following science domains: Earth and space science, physical science, and life science." Following these "initial recommendations", the SBE has two months by which to provide OSPI with "official comment and recommendations regarding the curricula". OSPI is then directed to make any changes based on the comment of the SBE and finalize the recommendations.

This letter provides a summary of the process by which core science materials were reviewed for their alignment with the revised K-12 Science Standards and presents to you my initial recommendations of science curricula materials. Following input from the Board and the SBE Science Panel this summer I will make my final recommendations as required by the law. I sincerely look forward to your further input and guidance regarding these initial recommendations.

Review Process Summary:

The 2009 Science Core Instructional Materials Review (IMR) process was designed to be rigorous, transparent, inclusive and reliable. As with the mathematics review, OSPI conducted a competitive bid process to solicit an external facilitator to co-lead the science review process and to provide support in data collection and statistical analysis. Following the review of proposals, Relevant Strategies, with Porsche Everson as the lead contractor was selected as our partner in this process.

During the development process professionals from across the science community, OSPI and SBE contributed to the success of the project during its multiple phases. Specifically, the SBE Science Panel and the OSPI Science IMR Advisory Group provided significant input to the review framework and the proposed minimum threshold by which a program should meet in its final content score to be included in the curricula recommendations. During the review week of

May 8-11, 2009, 69 reviewers reviewed 85 individual products from 20 publishing companies. Each program received four to five independent readings, with each reviewer taking an average of six hour per review. The review itself consisted of three primary levels:

1. **Content Review** (70% of the composite score) - This review included analysis of standards alignment and overall program coherence
2. **Key Program Elements Review**(30% of composite score) – This review included analysis of the following areas:
    - Student Learning
    - Facilitating Instruction
    - Equity and Accessibility
    - Assessment
3. **Conceptual Development Review –** Following the review week, top scoring programs were reviewed independently by university subject-area experts for their conceptual development quality.

The full 2009 K-12 Science Instructional Materials Review Preliminary Report and Initial Recommendations can be found on the OSPI website at (http://www.k12.wa.us/CurriculumInstruct/pubdocs/PublishersNotices/ScienceIMRPreliminaryDraftReport6-24-09.pdf). This report provides in-depth information regarding the process, programs reviewed, and specific data for each program.

Initial Curricular Recommendations:

The SBE Science Panel and the IMR Advisory Group also recommended that OSPI consider a threshold that a program should meet to be considered for the initial recommendations. In making these initial recommendations, I have selected materials that have met or exceeded a minimum composite score threshold of 0.7 with a 95% confidence level. Each program's weighted composite score was calculated and consisted of the data collected as part of the Content and Key Program Elements Reviews. The following table represents my initial recommendations of basic science curricula to be considered by the Board.

	Initial Curricula Recommendations	Composite Score
Elementary School (grades K-5)		
	○ No Initial Recommendations are made at this time at the Elementary level	No curricular materials met the 0.70 threshold in Composite Score
Middle School (grades 6-8)		
	○ *Science Explorer*-Pearson (Prentice Hall) ○ *Middle Level Modules in Life, Earth and Physical Science*-Holt McDougal	○ 0.8694 ○ 0.8147

	Initial Curricula Recommendations	Composite Score
	○ *Full Option Science System (FOSS)*-Delta Education	○ 0.7813
High School Domains (grades 9-12)		
Life Science Domain (one major course)	Biology: ○ *Biology: A Human Approach*-Kendall/Hunt (BSCS) ○ *Insights in Biology* -Kendall/Hunt	Biology: ○ 0.8981 ○ 0.7973
Earth and Space Domain (one major course)	Earth Science: ○ *EarthComm*-It's About Time Publishing	Earth Science: ○ 0.7992
Physical Science Domain (four major courses)	Chemistry: ○ *Active Chemistry* -It's About Time Publishing ○ *Chemistry*-Kendall/Hunt Integrated Science: ○ *Science: An Inquiry Approach*-Kendall/Hunt ○ *Coordinated Science*- It's About Time Publishing **Note: *Coordinated Science* is comprised of *EarthComm, Active Chemistry* and *Active Physics*. It does not have a life science component. Physical Science: ○ *Active Physical Science*- It's About Time Publishing ○ *Foundations of Physical Science*-CPO Science Physics: ○ Active Physics- It's About Time	Chemistry: ○ 0.8434 ○ 0.6854 (the 95% confidence level upper bound is 0.7163) Integrated Science: ○ 0.8023 ○ 0.7079 Physical Science: ○ 0.7077 ○ 0.6948 (the 95% confidence level upper bound is 0.7264) Physics ○ 0.8764

	Initial Curricula Recommendations	Composite Score
	Publishing	

Once again, I am looking forward to seeking further guidance from the Board and the SBE Science Panel regarding all of these rankings, with particular interest in their comments regarding the elementary programs and the integrated programs. While school districts will not be required to select the recommended curricula, this next phase of the process will be instrumental to assist me in making the most thoughtful decision on the final recommendations in order to best serve districts in the state of Washington.

If you have specific questions regarding the review process or the initial recommendations please contact the OSPI Teaching and Learning Science Office at (360) 725-6311 or Mary McClellan, Science Director for Teaching and Learning, at mary.mcclellan@k12.wa.us.

Sincerely,

Randy I. Dorn
State Superintendent of
Public Instruction

K-12 Core Science Instructional Materials Review

June 2009 Preliminary Report & Initial Recommendations

6-30-09

Table of Contents

Revision History

Date	Version Notes	Updated By
6/24/2009	Preliminary Draft Completed	Porsche Everson
6/30/2009	Preliminary Report with Initial Recommendations Completed	Porsche Everson

1 Project Overview

1.1 Introduction/Purpose

The purpose of this document is to describe the process and outcomes from the 2009 Core Science Instructional Material Review for K-12. The report contains information about the entire process, as well as statistical results from the review.

Although comprehensive, research-based instructional materials lie at the heart of the most effective science education programs, it is important to note that successful science programs may exist with many of the reviewed curricula. While instructional materials matter, other factors contribute to the success of students in Washington State learning science. Those factors include quality of instruction, parent involvement, available supports and myriad other aspects.

The recommended curricula will ultimately receive the bulk of attention within this report; however, it also provides other key results as well. These results include:

- **Support to districts in evaluating instructional materials:** Local school districts can use the rich set of information contained within this report to evaluate a wide variety of materials based upon factors they deem important, to help them make decisions in the future regarding science instructional materials adoptions.

- **Information on all instructional materials reviewed:** Districts who currently use instructional materials *that were not recommended* will find this report valuable. It contains detailed, specific information on how all programs reviewed meet the newly revised 2009 Washington State K-12 Science Standards. Instructors, coaches, curriculum specialists and administrators can easily see how their materials line up against the standards, course by course, and identify areas where supplementation may be needed. *No one set of instructional materials matches the new standards completely; each one will need some augmentation, even within the materials that are recommended.*

Key Points

- The evaluation process was rigorous and comprehensive. (Page 19)
- No elementary programs reviewed met the composite threshold for inclusion in the initial recommendations. (Page 6)
- Five products at the middle school level scored well. (Page 10)
- High School had 1-2 initial recommendations per course. (Page 17)
- The State Board of Education has two months to provide comment on the initial recommendations, then OSPI will issue final recommendations. (Page 32)
- All materials, even those that are recommended will need some degree of supplementation.
- Future versions of science instructional materials will likely have stronger alignment to Washington Science Standards.

Some words of caution are necessary. Reviews like this represent a point in time, in a continuously evolving process. New versions of materials may rapidly supplant those reviewed herein.

In general, there are multiple versions of instructional materials in use by districts across the state. This review process examined only one version of each program; typically the most recently copyrighted version. Readers should be aware that older versions of the programs would likely have different results. It is likely that many districts across the state may be using older versions of these programs.

The programs submitted for analysis in this review were evaluated against newly revised Washington State K-12 Science Standards. No publisher has had the chance to update their material to produce a new version since the science standards were released in April 2009. This review simply provides a baseline comparison, from which publishers can adapt their material to be more closely aligned with the recently revised Washington State K-12 Science Standards.

1.2 Scope and Background

The purpose of the project was to review core science instructional materials in order to fulfill the original legislative directive to make recommendations for no more than three basic science curricula each for elementary, middle and high school grade spans in cooperation with the State Board of Education.

Following the revision of the Washington State K-12 Science Standards (December 2008), the Office of Superintendent of Public Instruction (OSPI) was required by 2008 Senate Bill 6534, section 1(7)(c-g), and the 2008 supplemental budget bill (ESHB 2687) section 501, (6)(d-e) to make recommendations for no more than three basic science curricula each for elementary, middle, and high school grade spans to the State Board of Education (SBE)

Subsequent legislation (HB 5414) modified the terms of the original legislation to allow for recommendations by major courses at the high school level, and extended the deadline for making the recommendations to June 30, 2009.

Within two months after the presentation of the recommended curricula, the SBE shall provide official comment and recommendations to the State Superintendent of Public Instruction regarding the recommended science curricula. The State Superintendent of Public Instruction shall consider the comment and recommendations from the SBE and other community input. The Superintendent of Public Instruction will then recommend and adopt K-12 science curricula.

In addition to the recommended core science curricula, OSPI must identify supplemental material as necessary to support all the core programs. OSPI is issuing a separate report on supplemental science material.

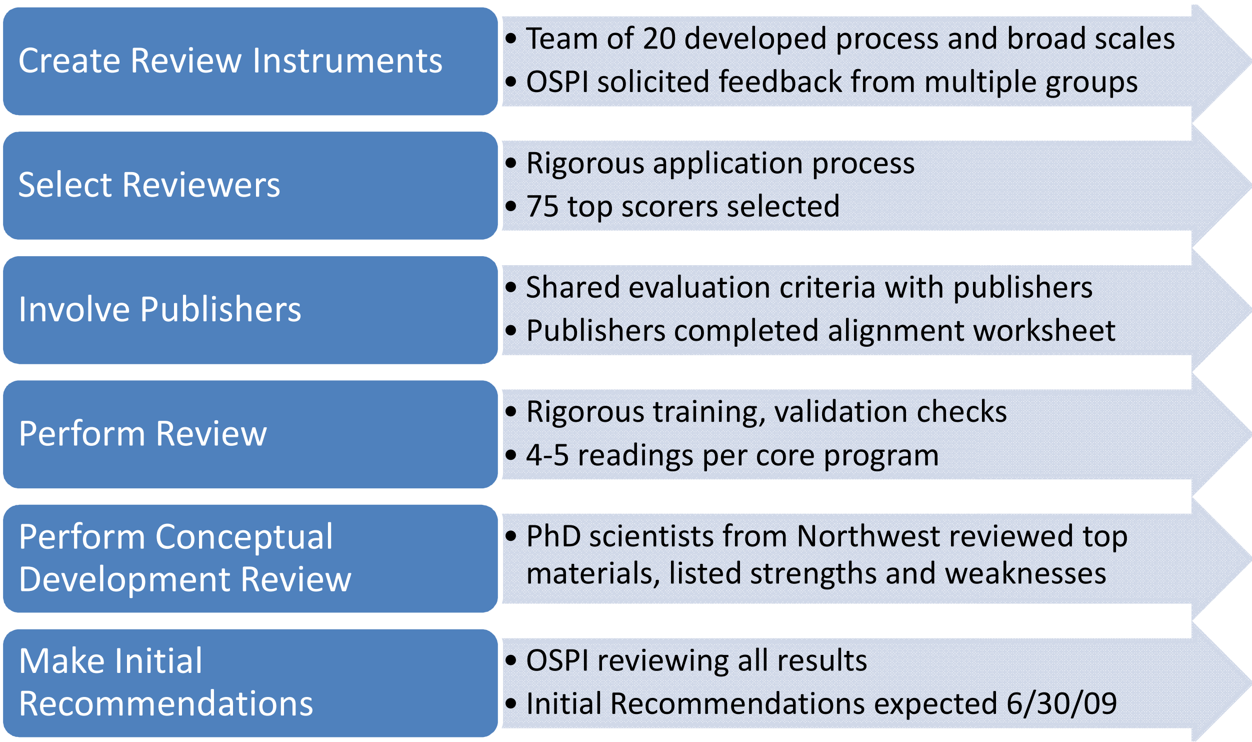
1.3 Contributing Stakeholders

Many people, representing multiple stakeholder groups from across the state, participated in the process of designing review instruments, evaluating instructional materials, and providing input throughout the project. Several representative groups are listed below. Please note that inclusion of the representative groups does not indicate that the group endorsed the outcomes from the review itself. See *Appendix C. Acknowledgements* for more information.

- State Board of Education Science Panel
- LASER Alliances and Leadership
- All Educational Service Districts
- Science Educators and WSTA
- Scientists
- Parents/PTA
- MESA
- Curriculum Specialists and Coaches
- District Administrators
- University Faculty

1.4 Process Overview

The following graphic highlights the major steps involved in the science instructional materials review. See *Section 2. Project Process* for more detail.



1.5 Findings

The following tables show the overall ranking for all core comprehensive programs submitted for review. The scale score is calculated by averaging the raw scores in a category, then dividing by the maximum possible scale value to obtain a scaled average. Each scale was assigned a weight. The weights were used to derive a final composite score.

The final composite score was calculated using the formula:

$$\sum(\textit{Average Scale Score})(\textit{Scale Weight})$$

Table 1. Scales and weights used to calculate the Composite Score.

	Standards Alignment	*Program Coherence*	*Facilitating Instruction*	*Student Learning*	*Equity and Accessibility*	*Assessment*	*Composite Score*
Scale Weights	*50%*	*20%*	*10%*	*10%*	*5%*	*5%*	*100%*

Table 2. Elementary program scale and composite scores.

Elementary Programs							
Program Name	***Standards Alignment***	**Program Coherence**	**Facilitating Instruction**	**Student Learning**	**Equity and Accessibility**	**Assessment**	**Composite Score**
Science Companion	0.59	0.79	0.68	0.83	0.45	0.78	0.67
STC	0.51	0.75	0.69	0.85	0.67	0.69	0.63
FOSS (K-5)	0.50	0.71	0.71	0.82	0.61	0.67	0.61
Science - Diamond Edition	0.55	0.63	0.73	0.61	0.74	0.61	0.60
Science: A Closer Look	0.59	0.64	0.61	0.60	0.65	0.45	0.60
Experience Science	0.41	0.41	0.45	0.49	0.31	0.37	0.42
Grand Total	*0.53*	*0.66*	*0.64*	*0.71*	*0.57*	*0.60*	*0.59*

Table 3. Middle school program scale and composite scores.

Middle School Programs							
Program Name	***Standards Alignment***	**Program Coherence**	**Facilitating Instruction**	**Student Learning**	**Equity and Accessibility**	**Assessment**	**Composite Score**
Science Explorer	0.88	0.81	0.94	0.92	0.97	0.64	0.87
ML: Science Modules	0.79	0.84	0.84	0.84	0.85	0.84	0.81
FOSS (6-8)	0.71	0.87	0.90	0.90	0.64	0.82	0.78
LA: Issues Series	0.64	0.83	0.74	0.81	0.63	0.69	0.71
IAT: Earth/Life/Physical Series	0.68	0.76	0.63	0.81	0.49	0.72	0.70
STC Earth/Life/Physical Series	0.47	0.75	0.68	0.78	0.52	0.63	0.59
Glencoe Earth/Life/Physical	0.54	0.53	0.64	0.62	0.80	0.47	0.57
Science - Diamond Edition	0.47	0.54	0.74	0.52	0.81	0.63	0.54
Holt Science & Technology	0.47	0.50	0.50	0.56	0.74	0.37	0.50
KH: Investigating Series	0.38	0.62	0.55	0.66	0.47	0.56	0.49
Glencoe Blue/Green/Red	0.37	0.44	0.56	0.47	0.71	0.32	0.43
Grand Total	*0.58*	*0.70*	*0.68*	*0.74*	*0.63*	*0.63*	*0.64*

Table 4. High school scale and composite scores by course.

High School Courses/Programs								
Course	**Program Name**	***Standards Alignment***	**Program Coherence**	**Facilitating Instruction**	**Student Learning**	**Equity and Accessibility**	**Assessment**	**Composite Score**
Biology	Biology: A Human Approach	0.88	0.89	0.94	0.96	0.86	0.97	0.90
	Insights in Biology	0.77	0.89	0.76	0.91	0.51	0.81	0.80
	Pearson Biology	0.62	0.67	0.63	0.74	0.82	0.74	0.66
	Glencoe Biology	0.68	0.54	0.68	0.68	0.79	0.58	0.65
	Agile Mind Biology	0.63	0.70	0.65	0.57	0.46	0.65	0.63
	Holt Biology	0.54	0.51	0.61	0.52	0.75	0.42	0.54
	McGraw-Hill Life Science	0.47	0.54	0.50	0.47	0.65	0.44	0.49
	What is Life? A Guide to Biology	0.49	0.59	0.12	0.29	0.40	0.31	0.44

High School Courses/Programs								
Course	**Program Name**	***Standards Alignment***	**Program Coherence**	**Facilitating Instruction**	**Student Learning**	**Equity and Accessibility**	**Assessment**	**Composite Score**
Biology Total		*0.64*	*0.68*	*0.62*	*0.66*	*0.67*	*0.62*	*0.65*
Chemistry	Active Chemistry	0.77	0.92	0.90	0.97	0.90	0.84	0.84
	Kendall/Hunt Chemistry	0.68	0.76	0.56	0.77	0.56	0.66	0.69
	Chemistry: Matter and Change	0.59	0.54	0.58	0.56	0.61	0.47	0.57
	Chemistry: C&A	0.53	0.62	0.55	0.57	0.54	0.47	0.55
	Chemistry in the Community	0.54	0.62	0.31	0.52	0.52	0.34	0.52
	Holt Modern Chemistry	0.56	0.47	0.43	0.43	0.49	0.42	0.51
	World of Chemistry	0.54	0.44	0.44	0.50	0.59	0.38	0.50
	Pearson Chemistry	0.42	0.47	0.61	0.47	0.75	0.51	0.48
	Investigating Chemistry	0.38	0.42	0.22	0.39	0.24	0.29	0.36
Chemistry Total		*0.57*	*0.60*	*0.52*	*0.59*	*0.58*	*0.50*	*0.57*
Earth Science	EarthComm	0.79	0.79	0.85	0.92	0.53	0.88	0.80
	Glencoe Earth Science: GEU	0.51	0.57	0.63	0.60	0.61	0.44	0.54
	Holt Earth Science	0.47	0.60	0.52	0.51	0.58	0.56	0.51
	McGraw-Hill Earth & Space Science	0.47	0.47	0.35	0.35	0.67	0.46	0.46
	Pearson Earth Science	0.30	0.31	0.39	0.40	0.54	0.21	0.33
	Science of Earth Systems	0.28	0.29	0.17	0.20	0.47	0.16	0.26
	Discovering the Universe	0.14	0.44	0.11	0.26	0.17	0.15	0.21
	Essential Earth	0.18	0.24	0.01	0.00	0.42	0.06	0.16
Earth Science Total		*0.39*	*0.46*	*0.38*	*0.40*	*0.51*	*0.36*	*0.41*
Integrated	Science: An Inquiry Approach	0.74	0.86	0.90	0.94	0.75	0.82	0.80
	Coordinated Science	0.55	0.86	0.85	0.96	0.74	0.90	0.71
	Science and Sustainability	0.42	0.74	0.68	0.87	0.57	0.76	0.58
	Conceptual Integrated Science	0.48	0.40	0.35	0.31	0.42	0.38	0.43
Integrated Total		*0.53*	*0.72*	*0.69*	*0.78*	*0.61*	*0.72*	*0.62*
Physical Science	Active Physical Science	0.65	0.75	0.78	0.83	0.68	0.76	0.71
	Foundations of Physical Science	0.73	0.71	0.60	0.71	0.56	0.56	0.69

High School Courses/Programs								
Course	**Program Name**	***Standards Alignment***	**Program Coherence**	**Facilitating Instruction**	**Student Learning**	**Equity and Accessibility**	**Assessment**	**Composite Score**
	Holt Physical Science	0.61	0.58	0.62	0.61	0.75	0.54	0.61
	Glencoe Physical Science	0.52	0.51	0.61	0.56	0.66	0.35	0.53
	Glencoe Physical Sci w/ Earth Sci	0.51	0.47	0.54	0.60	0.68	0.40	0.52
	Holt Physical, Earth & Space	0.51	0.43	0.58	0.43	0.65	0.43	0.50
	McGraw-Hill Physical Science	0.47	0.50	0.49	0.49	0.51	0.47	0.48
	Pearson Physical Science	0.51	0.33	0.46	0.47	0.68	0.28	0.46
	Conceptual Physical Science	0.40	0.40	0.32	0.40	0.38	0.25	0.39
Physical Science Total		*0.55*	*0.52*	*0.56*	*0.57*	*0.63*	*0.45*	*0.55*
Physics	Active Physics	0.83	0.89	0.94	0.97	0.89	0.92	0.88
	Foundations of Physics	0.59	0.69	0.56	0.65	0.30	0.61	0.60
	Holt Physics	0.65	0.40	0.47	0.61	0.56	0.36	0.56
	Physics: A First Course	0.62	0.49	0.39	0.49	0.50	0.36	0.54
	Conceptual Physics	0.51	0.54	0.51	0.40	0.43	0.36	0.50
	Glencoe Physics	0.55	0.42	0.38	0.46	0.39	0.42	0.48
Physics Total		*0.63*	*0.57*	*0.54*	*0.59*	*0.52*	*0.50*	*0.59*
Grand Total		*0.56*	*0.58*	*0.54*	*0.59*	*0.59*	*0.51*	*0.56*

The following tables and graphs show the 95% confidence intervals for the core programs by grade and course level. The confidence interval is calculated by the following formula. See *Section 5. Data Analysis Approach* for more detail.

$$CI = Composite \pm t(SE)$$

Table 5. Elementary program 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
Science Companion	0.6661	0.0083	0.6498	0.6823
STC	0.6258	0.0097	0.6067	0.6449
FOSS (K-5)	0.6066	0.0095	0.5880	0.6252
Science - Diamond Edition	0.6048	0.0100	0.5852	0.6244
Science: A Closer Look	0.5973	0.0094	0.5789	0.6158
Experience Science	0.4159	0.0098	0.3967	0.4351

Table 6. Middle school program 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
Science Explorer	0.8694	0.0146	0.8402	0.8987
ML: Science Modules	0.8147	0.0124	0.7902	0.8393
FOSS (6-8)	0.7813	0.0116	0.7584	0.8043
LA: Issues Series	0.7057	0.0105	0.6850	0.7264
IAT: Earth/Life/Physical Series	0.6972	0.0100	0.6776	0.7168
STC Earth/Life/Physical Series	0.5869	0.0097	0.5679	0.6059
Glencoe Earth/Life/Physical	0.5675	0.0132	0.5416	0.5934
Science - Diamond Edition	0.5404	0.0210	0.4982	0.5825
Holt Science & Technology	0.4952	0.0197	0.4560	0.5344
KH: Investigating Series	0.4890	0.0101	0.4692	0.5088
Glencoe Blue/Green/Red	0.4269	0.0169	0.3933	0.4606

Table 7. HS Biology 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
Biology: A Human Approach	0.8981	0.0101	0.8782	0.9181
Insights in Biology	0.7973	0.0138	0.7701	0.8246
Pearson Biology	0.6564	0.0210	0.6148	0.6980
Glencoe Biology	0.6531	0.0207	0.6120	0.6942

Program	Composite Score	SE	Lower Bound	Upper Bound
Agile Mind Biology	0.6332	0.0205	0.5926	0.6738
Holt Biology	0.5437	0.0161	0.5120	0.5754
McGraw-Hill Life Science	0.4949	0.0188	0.4579	0.5319
What is Life? A Guide to Biology	0.4401	0.0201	0.4004	0.4798

Table 8. HS Chemistry 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
Active Chemistry	0.8434	0.0124	0.8190	0.8678
Kendall/Hunt Chemistry	0.6854	0.0157	0.6544	0.7163
Chemistry: Matter and Change	0.5724	0.0188	0.5352	0.6095
Chemistry: C&A	0.5500	0.0187	0.5132	0.5868
Chemistry in the Community	0.5224	0.0227	0.4777	0.5671
Holt Modern Chemistry	0.5073	0.0224	0.4630	0.5516
World of Chemistry	0.4992	0.0179	0.4641	0.5344
Pearson Chemistry	0.4757	0.0232	0.4300	0.5215
Investigating Chemistry	0.3629	0.0214	0.3206	0.4052

Table 9. HS Earth & Space Science 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
EarthComm	0.7992	0.0185	0.7627	0.8357
Glencoe Earth Science: GEU	0.5434	0.0234	0.4971	0.5896
Holt Earth Science	0.5133	0.0167	0.4804	0.5463
McGraw-Hill Earth & Space Science	0.4553	0.0225	0.4109	0.4997
Pearson Earth Science	0.3281	0.0169	0.2946	0.3615
Science of Earth Systems	0.2648	0.0171	0.2311	0.2985
Discovering the Universe	0.2131	0.0193	0.1748	0.2514
Essential Earth	0.1615	0.0184	0.1250	0.1980

Table 10. HS Integrated Science 95% confidence intervals.

Program	Composite Score	SE	Lower Bound	Upper Bound
Science: An Inquiry Approach	0.8023	0.0164	0.7697	0.8348

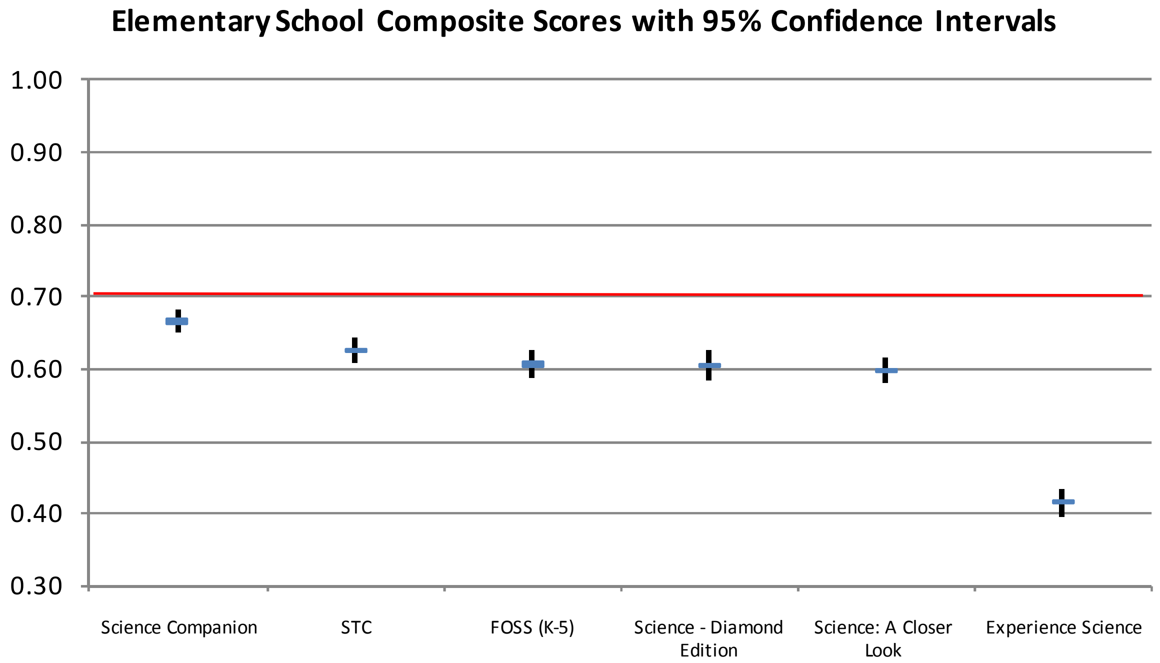
Program	Composite Score	SE	Lower Bound	Upper Bound
Coordinated Science	0.7079	0.0170	0.6744	0.7413
Science and Sustainability	0.5813	0.0139	0.5538	0.6087
Conceptual Integrated Science	0.4267	0.0174	0.3921	0.4614

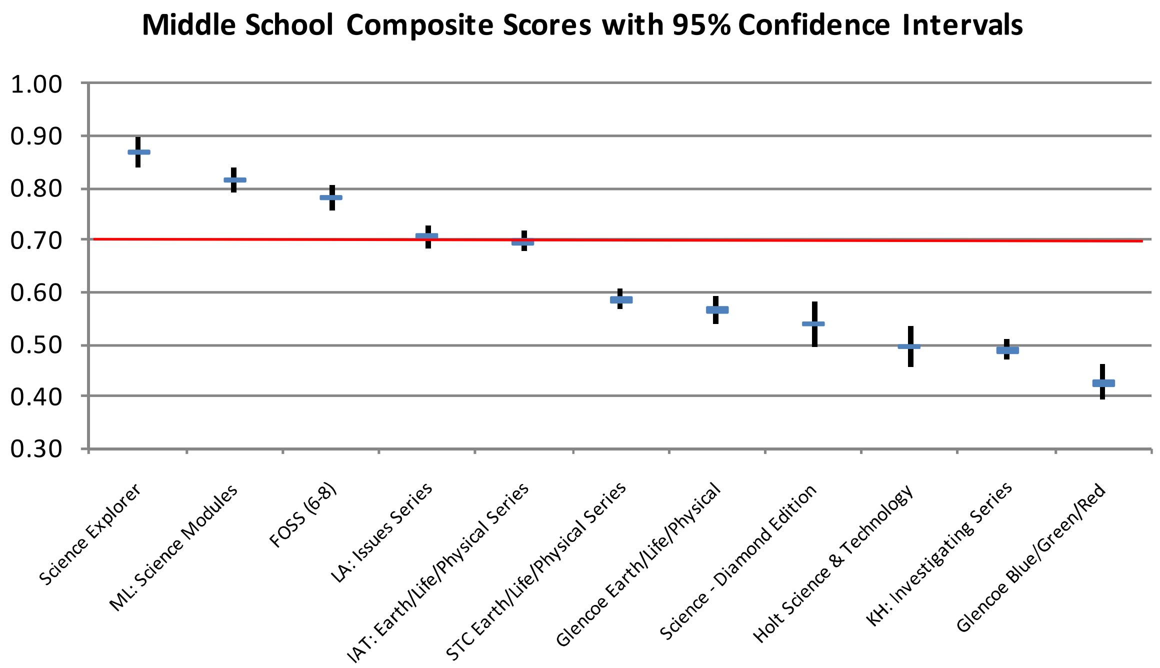
Table 11. HS Physical Science 95% confidence intervals.

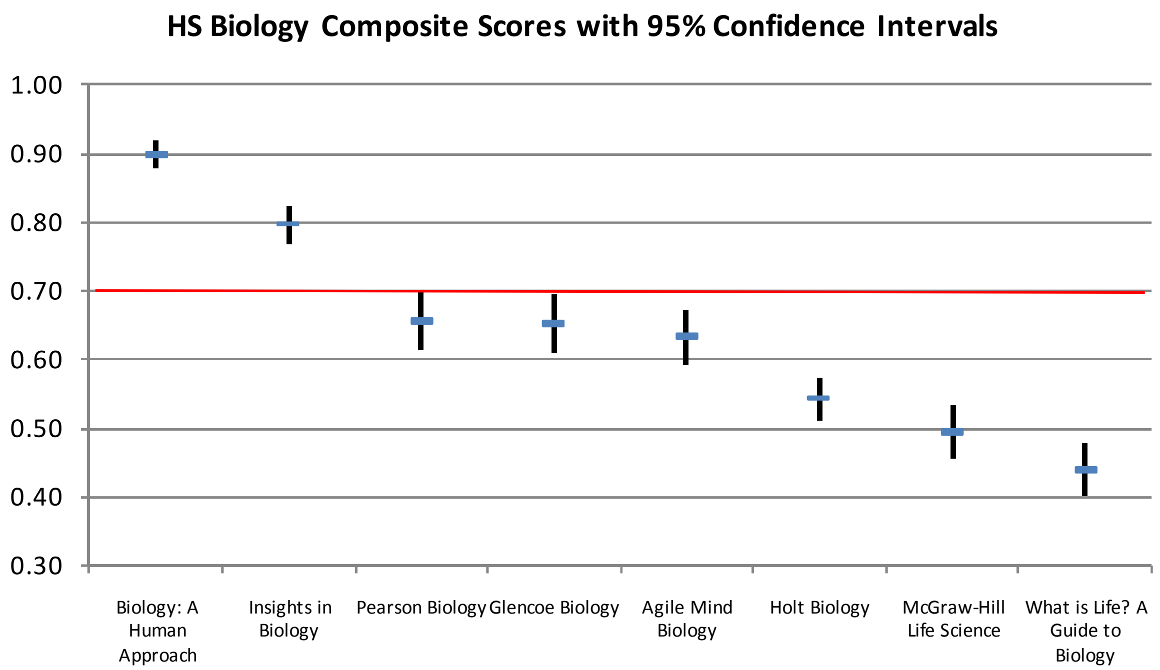
Program	Composite Score	SE	Lower Bound	Upper Bound
Active Physical Science	0.7077	0.0199	0.6683	0.7472
Foundations of Physical Science	0.6948	0.0160	0.6632	0.7264
Holt Physical Science	0.6097	0.0150	0.5801	0.6393
Glencoe Physical Science	0.5302	0.0162	0.4982	0.5622
Glencoe Physical Sci w/ Earth Sci	0.5185	0.0179	0.4831	0.5538
Holt Physical, Earth & Space	0.4956	0.0174	0.4612	0.5300
McGraw-Hill Physical Science	0.4807	0.0227	0.4357	0.5256
Pearson Physical Science	0.4636	0.0175	0.4290	0.4982
Conceptual Physical Science	0.3854	0.0228	0.3401	0.4307

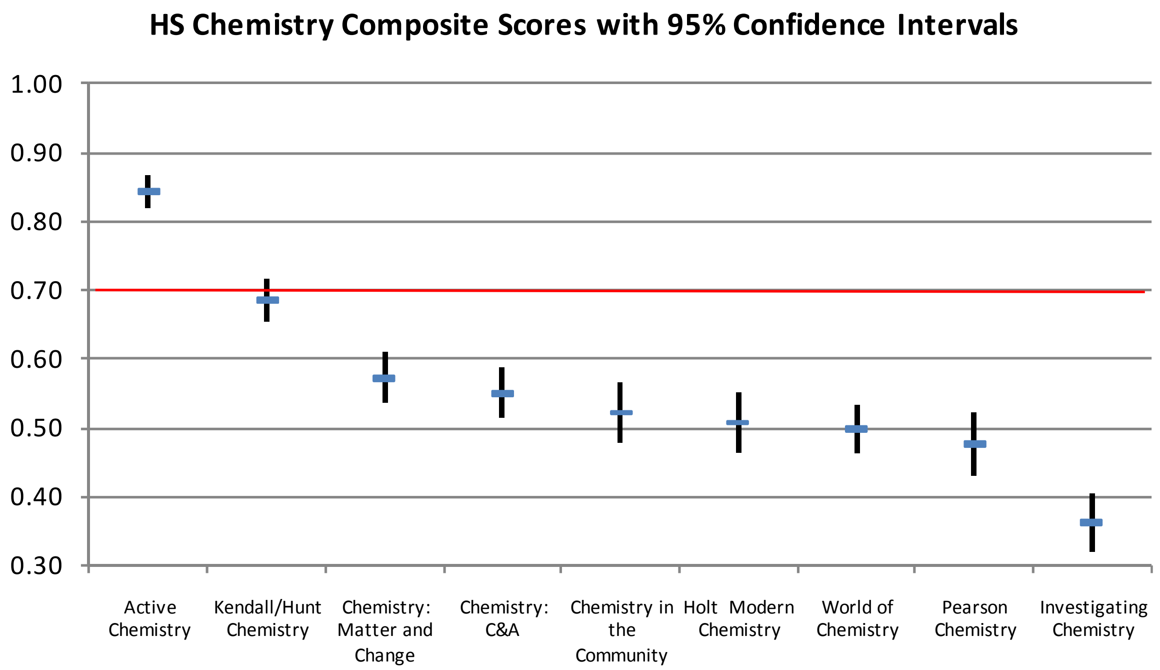
Table 12. HS Physics 95% confidence intervals.

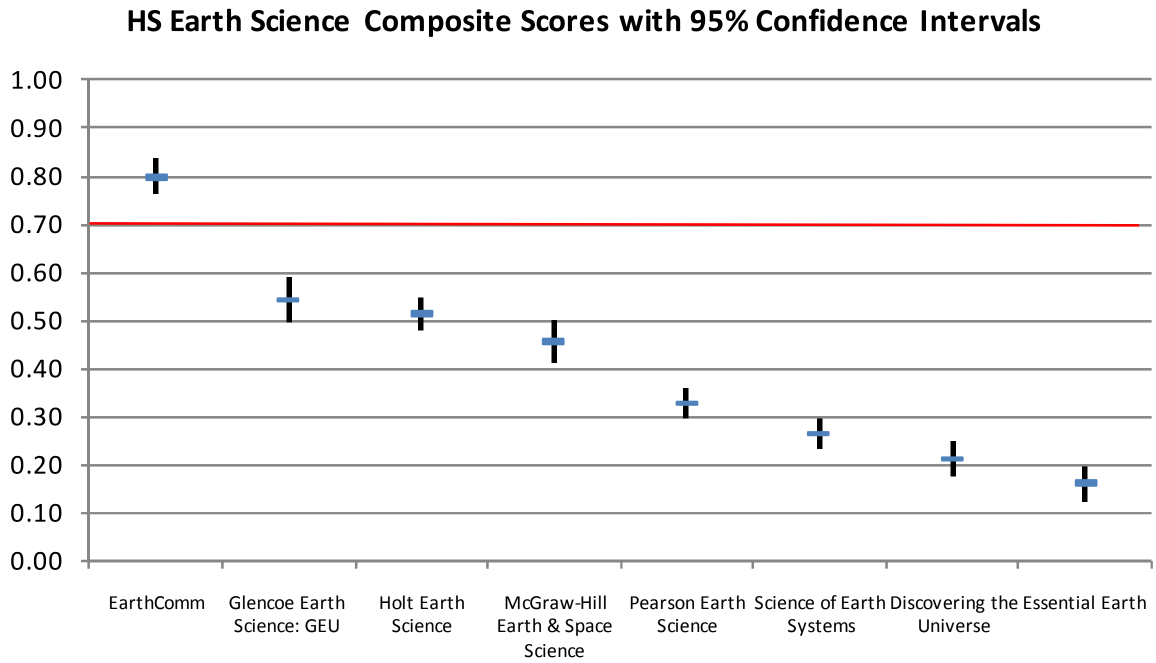
Program	Composite Score	SE	Lower Bound	Upper Bound
Active Physics	0.8764	0.0163	0.8442	0.9086
Foundations of Physics	0.6003	0.0244	0.5519	0.6487
Holt Physics	0.5573	0.0234	0.5111	0.6036
Physics: A First Course	0.5369	0.0202	0.4970	0.5768
Conceptual Physics	0.4963	0.0247	0.4476	0.5451
Glencoe Physics	0.4811	0.0199	0.4418	0.5205

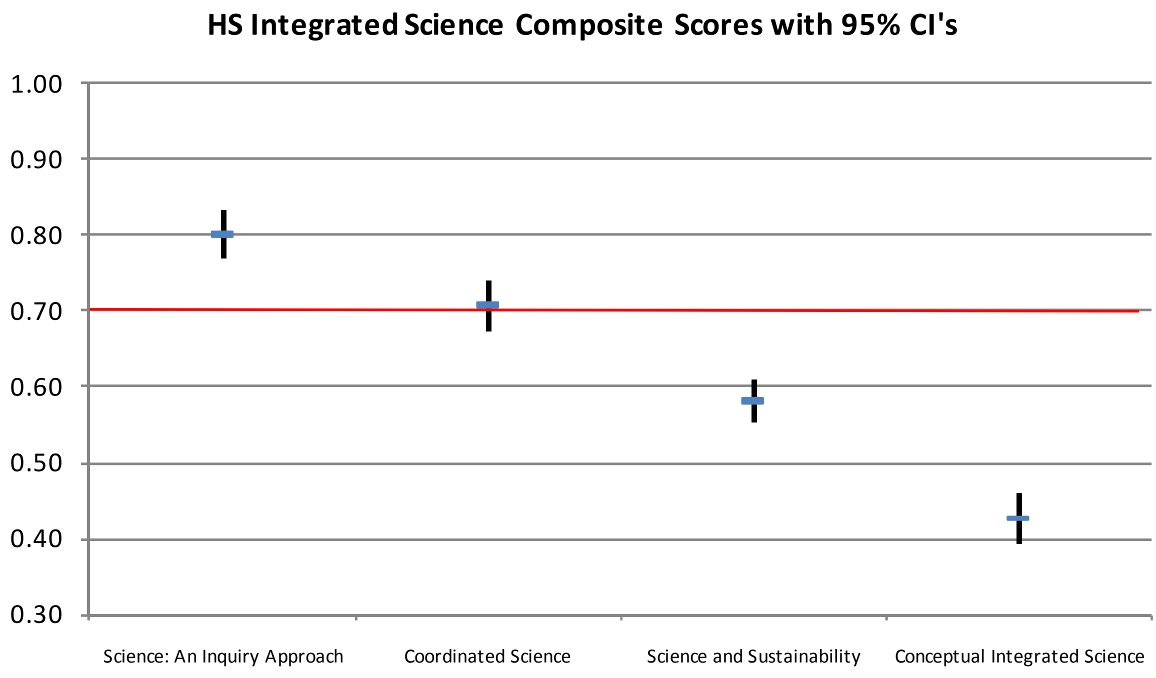

Elementary School Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Science Companion
STC
FOSS (K-5)
Science - Diamond Edition
Science: A Closer Look
Experience Science

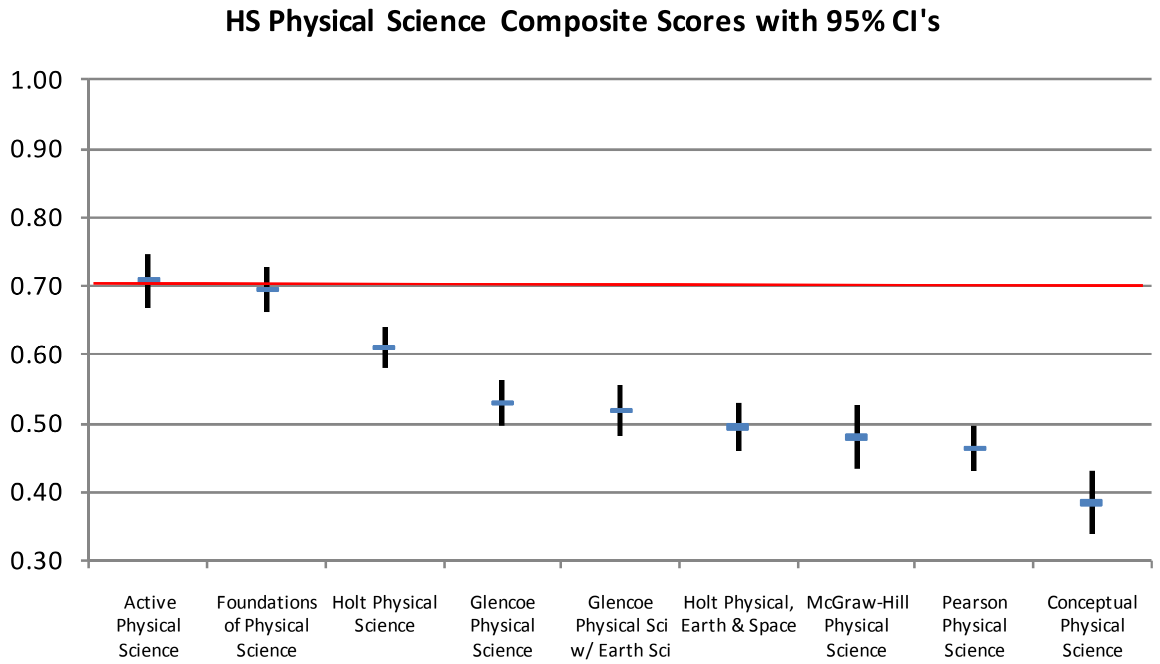

Middle School Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Science Explorer
ML: Science Modules
FOSS (6-8)
LA: Issues Series
IAT: Earth/Life/Physical Series
STC Earth/Life/Physical Series
Glencoe Earth/Life/Physical
Science - Diamond Edition
Holt Science & Technology
KH: Investigating Series
Glencoe Blue/Green/Red

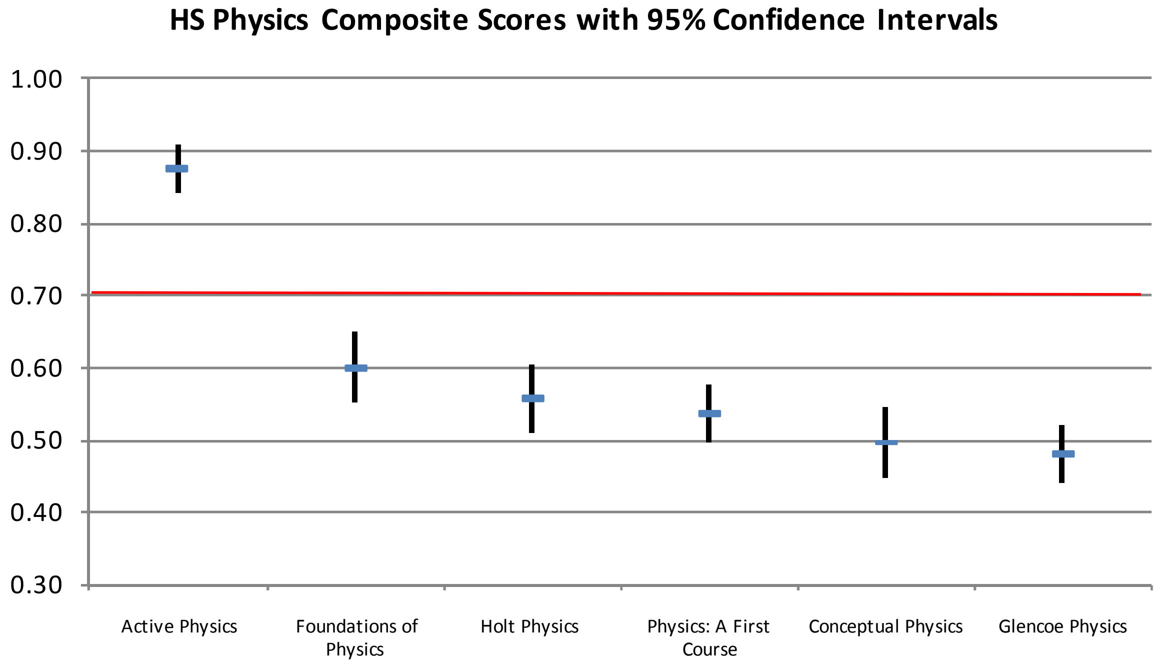

HS Biology Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Biology: A Human Approach
Insights in Biology
Pearson Biology
Glencoe Biology
Agile Mind Biology
Holt Biology
McGraw-Hill Life Science
What is Life? A Guide to Biology


HS Chemistry Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Active Chemistry
Kendall/Hunt Chemistry
Chemistry: Matter and Change
Chemistry: C&A
Chemistry in the Community
Holt Modern Chemistry
World of Chemistry
Pearson Chemistry
Investigating Chemistry


HS Earth Science Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
EarthComm
Glencoe Earth Science: GEU
Holt Earth Science
McGraw-Hill Earth & Space Science
Pearson Earth Science
Science of Earth Systems
Discovering the Universe
Essential Earth


HS Integrated Science Composite Scores with 95% CI's
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Science: An Inquiry Approach
Coordinated Science
Science and Sustainability
Conceptual Integrated Science


HS Physical Science Composite Scores with 95% CI's
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Active Physical Science
Foundations of Physical Science
Holt Physical Science
Glencoe Physical Science
Glencoe Physical Sci w/ Earth Sci
Holt Physical, Earth & Space
McGraw-Hill Physical Science
Pearson Physical Science
Conceptual Physical Science


HS Physics Composite Scores with 95% Confidence Intervals
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
Active Physics
Foundations of Physics
Holt Physics
Physics: A First Course
Conceptual Physics
Glencoe Physics

1.6 Initial Recommendations

The 2007 Washington State Legislature directed OSPI, in consultation with the SBE, to recommend no more than three basic science curricula at the elementary, middle and high school (by major course within the three domains of earth and space, physical, and life sciences) levels.

The following tables show the initial recommendations from Superintendent Dorn. The SBE has two months to provide comments. At that point, Superintendent Dorn will make final recommendations. It is important to note that the initial recommendations may change based upon SBE feedback.

The recommendations serve as a guide to school districts in the state of Washington regarding which curricula are most aligned with the revised Washington State K-12 Science Standards. Districts are not required to adopt materials within these lists.

Please note that OSPI has recommended the science curricula as per the legislated requirement. It is not the role of OSPI to direct which curricula a school district may or should select. It is not a state requirement for any district to specifically use the recommended curricula. *No one set of instructional materials matches the new standards completely; each one will need some augmentation, even those that are recommended.*

None of the elementary programs reviewed met the composite threshold of 0.70. Thus, OSPI has no initial recommendations at this time for the elementary level.

Middle School Initial Recommendations		
Publisher	**Program Name**	**Composite Score**
Pearson (Prentice Hall)	*Science Explorer*	0.8694
Holt McDougal	*McDougal Littell Science Modules*	0.8147
Delta Education	*Full Option Science System (FOSS)*	0.7813

High School Biology Initial Recommendations (Life Science Domain)		
Publisher	**Program Name**	**Composite Score**
Kendall/Hunt (BSCS)	*Biology: A Human Approach*	0.8981
Kendall/Hunt	*Insights in Biology*	0.7973

High School Chemistry Initial Recommendations (Physical Science Domain)		
Publisher	**Program Name**	**Composite Score**
It's About Time Publishing	*Active Chemistry*	0.8434
Kendall/Hunt	*Chemistry*	0.6854[1]

[1] The 95% confidence level upper bound is 0.7163.

High School Earth/Space Science Initial Recommendations (Earth and Space Science Domain)		
Publisher	**Program Name**	**Composite Score**
It's About Time Publishing	*EarthComm*	0.7992

High School Integrated Science Initial Recommendations (Physical Science Domain)		
Publisher	**Program Name**	**Composite Score**
Kendall/Hunt	*Science: An Inquiry Approach*	0.8023
It's About Time Publishing	*Coordinated Science*[2]	0.7079

High School Physical Science Initial Recommendations (Physical Science Domain)		
Publisher	**Program Name**	**Composite Score**
It's About Time Publishing	*Active Physical Science*	0.7077
CPO Science	*Foundations of Physical Science*	0.6948[3]

High School Physics Initial Recommendations (Physical Science Domain)		
Publisher	**Program Name**	**Composite Score**
It's About Time Publishing	*Active Physics*	0.8764

[2] Coordinated Science is comprised of EarthComm, Active Chemistry and Active Physics. It does not have a life science component. Superintendent Dorn has asked the SBE to comment on whether Coordinated Science should be considered for the final recommendation, given that it does not contain a life science component.

[3] The 95% confidence level upper bound is 0.7264.

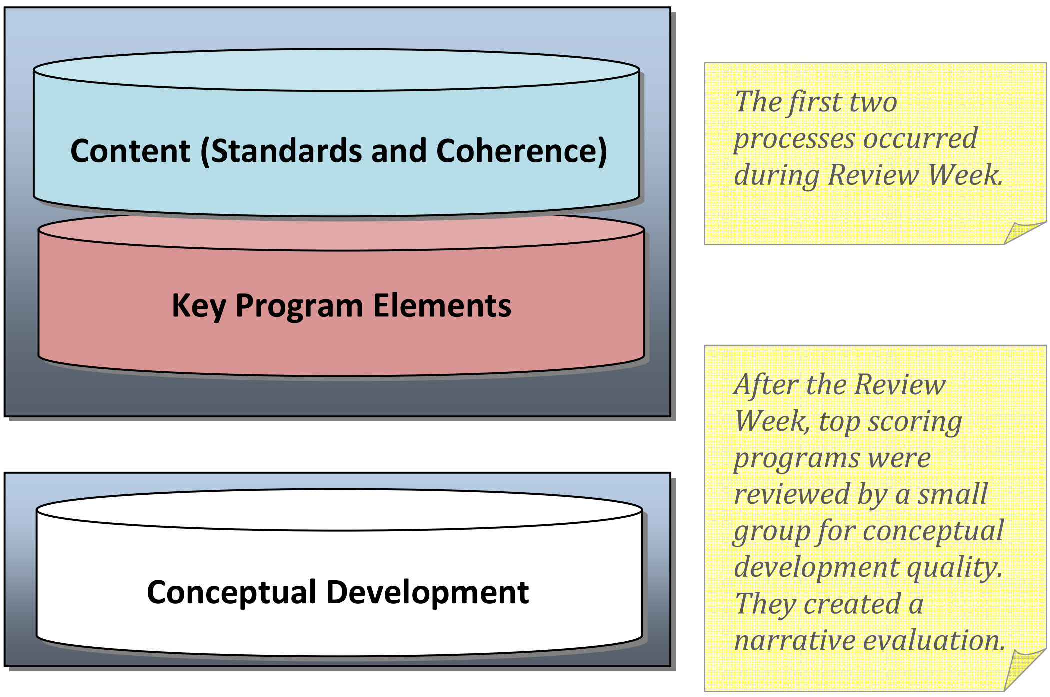
2 Project Process

2.1 Overview

The 2009 Core Science Instructional Materials Review involved high stakes outcomes, particularly the selection of no more than three basic curricula recommendations in the elementary, middle and high school grade spans (K-5, 6-8, and 9-12). Thus, the project processes and controls were designed to be rigorous, transparent, inclusive and reliable. Hundreds of professionals contributed to the success of the project during its multiple phases.

A team of 20 scientists, educators (K-12 and higher education), curriculum specialists, administrators and statisticians formed the Science IMR Advisory Group. They met in March 2009 to advise OSPI on the development of the review instruments.

The IMR Advisory Group proposed a three-level process framework for reviewing science instructional materials. The three processes are evaluations of Content (Standards and Coherence), Key Program Elements, and Conceptual Development.



The first two processes were addressed during the Core Instructional Materials Review week. Reviewers used two instruments (Content and Key Program Elements) to evaluate the materials.

The third process occurred after the Review Week was complete. In the Conceptual Development process, the top ranked programs[4] in K-5, 6-8 and the high school course domains of Earth and

[4] Top-ranked programs are those that have the highest composite scores from the two instruments, Content (Standards and Coherence) and Key Program Elements.

Space, Physical Science, Physics, Chemistry, Biology and Integrated series were evaluated by a small team of qualified reviewers (Ph.D. university scientists). They provided a narrative evaluation of their findings. See *Section 4 Conceptual Development Review Results* for the narrative evaluations.

There were three steps throughout the entire framework that filtered out materials from further consideration for the final recommendations. Classifying steps include:

- First, submitted materials that did not fall into the category of core science material (for example, an oceanography text or advanced placement materials) did not undergo the initial review.
- Second, only programs that had an average composite sore of greater than 0.7 (on a 1.0 scale) were eligible for consideration for the initial recommendations.
- Third, the composite score of the eligible programs, consisting of both the Content (Standards Alignment and Program Coherence) – (70%) and Key Program Elements (30%) weighted averages provided a ranking of the top programs.

In addition, the top-ranked programs underwent an in-depth Conceptual Development Review. The university scientists reviewing the materials provided a narrative evaluation of the materials, listing their strengths and weaknesses. The Conceptual Development Review represents the professional opinion of the individual reviewer, and is included to provide additional information to districts. Information in the Conceptual Development Review may be considered by OSPI in making the final recommendations.

2.2 Review Instrument Development

This section describes the process by which the review instrument and weights were developed. It also includes the scoring rubric for the Standards Alignment. See *Appendix A.*

Review Instruments for more details on the scales and instruments used by the reviewers.

To develop the review instruments, OSPI engaged the Instructional Materials Advisory Group in two full cycles of development and revision. The IMR Advisory Group and the SBE Science Panel were the two primary groups contributing to the development of the instruments. Their work was research based, and used the following primary sources:

- 2009 Revised Washington State Science Standards
- *National Science Education Standards*, (National Research Council, 1993)
- *How People Learn: Brain, Mind, Experience and School* (Bransford, Brown, Cocking, 2000)
- *Ready, Set , Science: Putting Research to Work in K-8 Classrooms* (Shouse, Schweingruber, 2008)
- *Atlas for Science Literacy* (American Association for the Advancement of Science, Vol. 1, 2001 and Vol.2, 2007)

The IMR Advisory Group examined ten instruments used to review science instructional materials within Washington and across the US. They identified aspects of each instrument that could work well, and those that they recommended OSPI avoid. The group identified and defined other instruments and scales[5] for use in the review.

The outcomes from the review instrument design phase included:

- Two review instruments, Content (Standards Alignment and Program Coherence) and Key Program Elements, which are described below.
- A proposed threshold for final recommendations. The IMR Advisory Group recommended that in order for programs to be considered for the final three recommendations, they must first meet a minimum threshold in content/program coherence. A scaled score of 0.70 was proposed as this threshold with a recommendation that the threshold be adjusted if necessary if a sufficient number of materials failed to reach the threshold.
- Weighting percentages for the scales in Content/Program Coherence and Key Program Elements.

These documents were then reviewed by the SBE Science Panel, CARC and science educational leaders from across the state. Their input was carefully considered and incorporated into the review instruments where deemed appropriate by the IMR Advisory Group.

2.2.1 Content Scales

The Content instrument consists of two scales, a measure of the alignment to the revised Washington State K-12 Science Standards, and Program Coherence, which evaluates sequence, organization, and the degree to which the materials ground learning in a larger framework.

[5] A scale is a set of one or more related items or questions that seek to measure one theme. Instruments (or surveys) are typically made up of one or more scales.

2.2.1.1 Standards Alignment Scale

The Standards Alignment scale measured alignment to the revised Washington K-12 Science Standards, including both the cross-cutting and the domain standards. All standards within the scale had equal weight.

Grades 6-8		Date:	
Program:		Reviewer #:	

(N-not applicable, 1-little or no coverage, 2-important content missing, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: *Inputs, Outputs, Boundaries and Flows*			
6-8 SYSA		① ② ③ ④	
6-8 SYSB		① ② ③ ④	
6-8 SYSC		① ② ③ ④	
6-8 SYSD		① ② ③ ④	
6-8 SYSE		① ② ③ ④	
6-8 SYSF		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: *Questioning and Investigating*			
6-8 INQA		① ② ③ ④	
6-8 INQB		① ② ③ ④	
6-8 INQC		① ② ③ ④	
6-8 INQD		① ② ③ ④	
6-8 INQE		① ② ③ ④	
6-8 INQF		① ② ③ ④	
6-8 INQG		① ② ③ ④	
6-8 INQH		① ② ③ ④	
6-8 INQI		① ② ③ ④	

EALR 3: Application (APP) – Core Content: *Science, Technology, and Solving Problems*			
6-8 APPA		① ② ③ ④	
6-8 APPB		① ② ③ ④	
6-8 APPC		① ② ③ ④	

Figure 1. Sample Scoring/Evidence Sheet for Standards Alignment.

The following scoring rubric assisted reviewers in selecting a response on the Standards Alignment Scoring/Evidence Sheet.

Table 13. Standards Alignment Scoring Rubric.

All or most of the content in the standard is missing (1)	A significant amount of the content in the standard is missing (2)	Most but not all of the content is present in the standard (3)	All of the content in the standard is fully present(4)
• All or most of the content in the standard is missing in the program. - It may be completely absent. - It may be briefly mentioned, but it is not developed. - It may contain less sophisticated precursor content that would lead to the content in the standard. • *Most students would not be able to achieve mastery with the core program materials.*	• Some significant aspect of the content is not present. - Some of the content may be completely absent. - Some of the content may be less rigorous. • It would take significant time and knowledge to fill the content gaps in the program. • *Many students would not be able to achieve mastery with the core program materials without some content supplementation.*	• The key content from the standard exists in the program. • The core materials need supplementation to do such things as adding additional opportunities for learning or finding other representations to help students consolidate learning. • *Many students would achieve mastery with the core program material.*	• The content from the standard is fully present. • There are sufficient teaching and learning opportunities to ensure mastery. • *80-100% of students would be able to achieve mastery with the core program materials.*

2.2.1.2 Program Coherence Scale

The Program Coherence scale measures how well the materials present content in an organized and deliberate sequence designed to develop conceptual understanding. It also evaluates how well the materials make explicit the big ideas of science and ground learning in a larger framework. It is a part of the overall Content measurement, along with the Standards Alignment scale.

The following items measure Program Coherence. The scale uses a four point response, with a Likert pattern of *Not Evident, Somewhat Evident, Mostly Evident,* or *Strongly Evident*.

1. Program presents content in an organized and deliberate sequence designed to develop conceptual understanding. Facts and concepts are linked and developed in ways that

facilitate retrieval and application, and engages student thinking about phenomena, experiences, and knowledge.

2. Program meets and makes explicit the big ideas of science.
3. Program is organized into units, modules or other structures, focused on student learning experiences that provide sufficient time to develop deep understanding of a few concepts.
4. Program provides opportunities for students to apply understanding to new situations, to relate material to real-world experiences and situations, and to draw connections between personal and classroom experiences.
5. Program promotes interdisciplinary and cross-curricular connections.
6. Program contains little or no extraneous material outside of expected grade level standards.[6]

2.2.2 Key Program Elements Scales

The IMR Advisory Group developed the following four scales to be used to measure important factors outside of standards alignment and program coherence.

Scale	Description
Assessment	Formative and summative assessments that use a variety of strategies are available within the materials. They promote student thinking about their ideas and prior conceptions, and promote student metacognition. They measure student knowledge and understanding of the science content. They help inform teachers about instruction.
Equity and Accessibility	The materials are free from bias (e.g. race, culture, age, gender and disabilities) and provide accommodations for individual and cultural differences, different learning styles and language proficiency.
Facilitating Instruction	Tools that support teacher's instructional practice are included. Teacher work is explicitly outlined. The materials provide background information on both content and the instructional approaches used within the materials. The materials have an instructional approach that is research based[7]. Directions for use of the various student support materials are included.
Student Learning	Instructional materials promote authentic, relevant and engaging learning experiences for students that mirror the

[6] This item uses a reverse score. Generally a value of "Strongly Evident" on other questions is considered good. On this item, a "Not Evident" is considered good. The data was re-coded on this item before final analysis.

[7] The revised Washington K-12 Science Standards were based on key research, including How People Learn, Ready Set Science, AAAS, National Science Standards, among others. See page 12-13 in the revised Washington K-12 Science Standards document for a complete list of commonly accepted research bases.

	work of scientists and real-world applications. Student learning goals are clearly defined within the unit and lesson. Students engage in a variety of inquiry experiences (e.g. observations, field studies, models, open-ended explorations, and/or conducting controlled scientific investigations). Students learn and apply problem solving skills. Students communicate learning in multiple ways (e.g., charts, graphs, tables, technology, presentation, etc.).

2.2.2.1 Assessment

1. Assessments cause students to surface, express, clarify, and justify their ideas and prior conceptions.
2. The materials provide teachers with specific tools to score and analyze assessments, as well as teacher support on how to use assessments to provide feedback to students and to make instructional decisions.
3. The material causes students to reflect and monitor their own understanding.
4. Assessment items align with big ideas, and specific ideas that support understanding of the big ideas are assessed.
5. Materials include assessment tasks that require the application of familiar ideas through novel tasks at the same level of sophistication as the familiar tasks.
6. Teachers are encouraged to regularly assess student thinking using a variety of assessment strategies.

2.2.2.2 Equity and Accessibility

1. The program provides methods and accommodations for differentiating instruction based on individual & cultural differences, disabilities, gifted / talented students, ELL, disadvantaged students.
2. Materials accommodate a variety of learning styles.
3. Materials accommodate different levels of language proficiency, and are available in a variety of languages.
4. Materials contain racial/ethnic/gender/disability balance in reference to individuals, groups, and in illustrations.
5. Differing racial/ethnic group references in the materials reflect like qualities such as leadership, imagination, and the ability to perform similar work.

6. Male and female references in the materials reflect like qualities such as leadership, imagination, and the ability to perform similar work.

2.2.2.3 Facilitating Instruction

1. Program provides background information for teachers, including an instructional model; content, process, & instructional method background; commonly held student ideas; and cognitive prompts.
2. Program is based on current learning research in "*How People Learn*".
3. Program provides methods for supporting diverse learners.
4. Program includes background information and suggested teaching strategies for the abilities of inquiry.
5. Program provides a variety of resource materials, such as CDs / DVDs, websites and other multi-media, and guides instructors in how to integrate these materials into the classroom.
6. Program guides the use of lab materials & equipment.

2.2.2.4 Student Learning

1. The program promotes authentic learning experiences that mirror the work of scientists and real-world applications.
2. The program utilizes a variety of relevant and engaging materials and strategies to involve students in learning.
3. Student learning goals are clearly defined within the unit and lesson. Students monitor their progress in achieving learning goals.
4. Students engage in a variety of inquiry experiences (e.g. observations, field studies, models, open-ended explorations, and/or conducting controlled scientific investigations).
5. Students communicate learning in multiple ways (e.g. charts, graphs, tables, technology, presentation, etc.).
6. Students use evidence to generate explanations and support conclusions.

2.2.3 Scale Weights

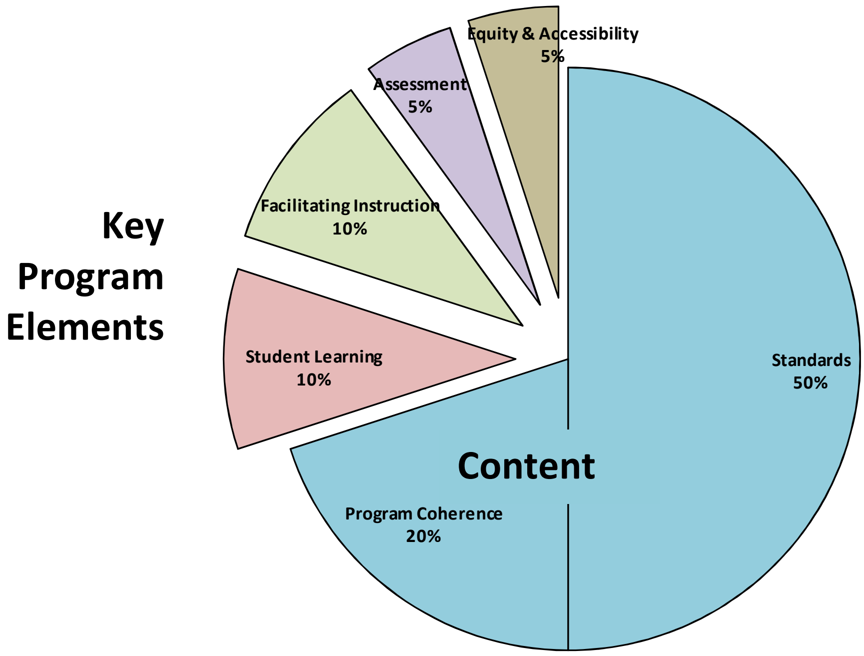


Figure 2. Scale weights for two review instruments, Content and Key Program Elements.

The Content Instrument (70%) consists of two scales, Program Coherence at 20% and Standards Alignment at 50% of the total weight. The Key Program Elements Instrument has four scales: Student Learning (10%), Facilitating Instruction (10%), Assessment (5%) and Equity & Accessibility (5%). See pages 22-26 for a description of the scales.

2.3 Reviewer Selection

OSPI sent out a broad invitation to science educators, curriculum specialists, science coordinators, district administrators, university scientists, parent groups and others to apply for a reviewer position. Each applicant filled out a comprehensive application, which was scored by two evaluators. Over 100 qualified applications were received. OSPI selected 75 of the top applicants by score to participate in the review, ensuring in the selection process that the reviewers represented a broad range of stakeholder groups, including educators, parents, scientists, and advocacy groups like LASER and MESA. See *Appendix C.* for a list of participating reviewers.

2.4 Publisher Involvement

Publishers were invited to attend a pre-meeting with OSPI and project staff to discuss the legislative requirements, proposed process, and evaluation criteria. Publishers were able to ask questions at this meeting and subsequently via email. OSPI produced and posted on the web a Frequently Asked Questions document addressing their questions.

As part of the review process, publishers were asked to provide a self-evaluation of how their instructional materials align to revised Washington State K-12 Science Standards, a program overview and a research summary. Reviewers used all three documents to help with their independent evaluation of the instructional materials.

2.5 Review Week Process

Sixty-nine reviewers participated during the Review Week, held in Vancouver, WA, May 11-15, 2009. The reviewers received 1.5 days of training, incorporating the science standards, *How People Learn*, research bases, instrument use, and a sample group review. The first review was done independently by two reviewers, who then compared their scores, discussed variances, and optionally, adjusted their scores based upon a better understanding of the scoring guidelines.

Reviewers were grouped into grade ranges based upon their experience and expertise. They were randomly assigned programs to review within their grade band. Reviewers evaluated 10-15 programs each.

Reviewers worked independently and avoided commenting to others on the material they were reviewing. Reviewers received daily variance reports, which highlighted score differences of 2 or more. They had the opportunity to discuss the individual item variances among the reviewers of a particular program, and optionally adjust their score. In most instances where a variance existed, a reviewer missed evidence that a standard was addressed, or the reviewer had a misconception of how to evaluate a particular standard. The daily variance checks served to identify individual instances where a reviewer missed evidence found in the materials, and also helped establish norms for interpreting standards and the scoring rubric.

OSPI used a formal library system and checkout protocol to help manage materials. A reviewer requested a set of materials from their randomly assigned list, identifying the publisher, program and grade level. Library staff delivered the set of materials to the reviewer. Before starting each review, the reviewer checked the inventory of materials to ensure that all subcomponents were present in the bin.

After confirming the inventory, the reviewer read the Program Overview, Research Summary and familiarized themselves with the program organization and materials set. The reviewers spent 4.5 hours on average reviewing each program. They filled out the review instruments and a general comments form. Once complete, they turned in their materials and instruments to the library and requested another set of materials from their list.

Each program had 4 or 5 independent reads. The subsequent analysis used an average rating for each item, based upon all the program reads.

2.6 Data Analysis Process

During review week, the 69 reviewers reviewed 85 individual products (program-grade range) from 20 publishing houses. There were a total of 402 individual readings, with over 29,000 total data elements collected.

A team of data entry specialists entered data in near real-time. After the data was entered, the lead analyst performed a validation check, randomly comparing 11% of the paper forms with the electronic data (4,497 item checks). Six errors were found, a rate of 0.13%. The errors identified in the validation check were corrected. Subsequent analysis showed that the error rate was insignificant and no more correction checks were performed. The estimated data entry error rate was well below a threshold which would impact the final results.

Next, the data was cleaned. Some middle and high school courses had data collected outside their expected course area. For example, an earth science text had some data elements in the life science standards. (Some publishers noted that their course texts also covered alternate material in other subjects, and reviewers checked the quality of that coverage.) This data was considered ancillary to the core analysis and was dropped. The program titles were edited for final graphics production.

There was one reverse-score item on the Program Coherence scale, which was adjusted for consistent data analysis. This item, "Program contains little or no extraneous material outside of expected grade level standards", uses a reverse score. Generally a value of "Strongly Evident" on other questions is considered good. On this item, a "Not Evident" is considered good. The data was re-coded on this item before final analysis.

Two statisticians worked independently on exploratory data analysis and initial statistical analysis. They compared their results to ensure accuracy. A more detailed description of the statistical analysis can be found in *Section 5. Data Analysis Approach.*

2.7 Conceptual Development Review

The final review process was a detailed review of a few Big Ideas across multiple grade levels or units to see how the instructional material developed, supported and synthesized students' deep conceptual understanding of scientific inquiry, applications, systems and the domains of science. A few highly skilled reviewers (Ph.D. university scientists), knowledgeable about current learning research and thinking in the scientific community, evaluated the programs using a summary of the AAAS curricular review tool as a suggested guideline, and provided a narrative evaluation of the top-ranked products. They listed the strengths and weaknesses of each reviewed product, plus their general comments. Their comments can be found in *Section 4. Conceptual Development Review Results.*

We expected to use a content threshold of 0.7 as one of two filters for forwarding programs to the Conceptual Development Review. The other filter was the top three programs by composite score, plus ties. Products would have to meet both filters to progress. However, in most instances, products in the recommendations categories did not reach the content threshold level, so we had to use an alternate rule, which was that we forwarded the top three programs by composite score, plus ties. In middle school, a few additional individual course books were also included, based upon their high composite score, but the final recommendations for middle school will use the composite score for the entire series, not individual texts.

The content threshold score was calculated using an average based on the scale weights, as shown below. In total, the two content scales accounted for 70% of the final composite score, with the Standards accounting for 50% and Program Coherence 20%.

$$Content\ Threshold = \frac{5(Standards)}{7} + \frac{2(Program\ Coherence)}{7}$$

Elementary Content Threshold				
Publisher	**Program**	**Standards Alignment**	**Program Coherence**	**Threshold**
Carolina Curriculum	**STC**[8]	0.51	0.75	0.58
Chicago Ed Pub Co, LLC	**Science Companion**	0.59	0.79	0.65
Delta Education	**FOSS (K-5)**	0.50	0.71	0.56
Houghton Mifflin Harcourt	Experience Science	0.41	0.41	0.41
MacMillan	**Science: A Closer Look**	0.59	0.64	0.60
Pearson (Scott Foresman)	**Science - Diamond Edition**	0.55	0.63	0.58
Elementary Total		*0.53*	*0.66*	*0.56*

Middle School Content Threshold				
Publisher	**Program**	**Standards Alignment**	**Program Coherence**	**Threshold**
Carolina Curriculum	STC Earth/Life/Physical Series	0.47	0.75	0.55
Delta Education	**FOSS (6-8)**	0.71	0.87	0.75
Glencoe	Glencoe Blue/Green/Red	0.37	0.44	0.39
Glencoe	Glencoe Earth/Life/Physical	0.54	0.53	0.54
Holt McDougal	Holt Science & Technology	0.47	0.50	0.48
Its About Time	IAT: Earth/Life/Physical Series	0.68	0.76	0.70
Kendall/Hunt (BSCS)	KH: Investigating Series	0.38	0.62	0.45
LAB-AIDS Inc.	LA: Issues Series	0.64	0.83	0.69
McDougal Littell	**ML: Science Modules**	0.79	0.84	0.80
Pearson (Prentice Hall)	**Science Explorer**	0.88	0.81	0.86
Pearson (Scott Foresman)	Science - Diamond Edition	0.47	0.54	0.49
Science Curriculum Inc.	SCI: Introductory Physical Science	0.29	0.53	0.36
Middle School Total		*0.57*	*0.70*	*0.61*

[8] Bolded items represent programs that were forwarded to the Conceptual Development Review Process.

High School Content Threshold					
Course	**Publisher**	**Program**	**Standards Alignment**	**Program Coherence**	**Threshold**
Biology	Agile Mind	**Agile Mind Biology**	0.63	0.70	0.65
	Bedford, Freeman & Worth	What is Life? A Guide to Biology	0.49	0.59	0.52
	Glencoe	**Glencoe Biology**	0.68	0.54	0.64
	Holt McDougal	Holt Biology	0.54	0.51	0.53
	Kendall/Hunt	**Insights in Biology**	0.77	0.89	0.81
	Kendall/Hunt (BSCS)	**Biology: A Human Approach**	0.88	0.89	0.88
	McGraw-Hill/Wright	McGraw-Hill Life Science	0.47	0.54	0.49
	Pearson (Prentice Hall)	**Pearson Biology**	0.62	0.67	0.63
Biology Total			*0.64*	*0.68*	*0.65*
Chemistry	Bedford, Freeman & Worth	**Chemistry in the Community**	0.54	0.62	0.57
	Bedford, Freeman & Worth	Investigating Chemistry	0.38	0.42	0.39
	Glencoe	**Chemistry: C&A**	0.53	0.62	0.55
	Glencoe	**Chemistry: Matter and Change**	0.59	0.54	0.58
	Holt McDougal	Holt Modern Chemistry	0.56	0.47	0.54
	Holt McDougal	World of Chemistry	0.54	0.44	0.51
	Its About Time	**Active Chemistry**	0.77	0.92	0.81
	Kendall/Hunt	**Kendall/Hunt Chemistry**	0.68	0.76	0.70
	Pearson (Prentice Hall)	Pearson Chemistry	0.42	0.47	0.43
Chemistry Total			*0.57*	*0.60*	*0.57*
Earth Science	Bedford, Freeman & Worth	Discovering the Universe	0.14	0.44	0.23
	Bedford, Freeman & Worth	Essential Earth	0.18	0.24	0.20
	Delmar Cengage Learning	Science of Earth Systems	0.28	0.29	0.28
	Glencoe	**Glencoe Earth Science: GEU**	0.51	0.57	0.53
	Holt McDougal	**Holt Earth Science**	0.47	0.60	0.50
	Its About Time	**EarthComm**	0.79	0.79	0.79
	McGraw-Hill/Wright	McGraw-Hill Earth & Space Science	0.47	0.47	0.47
	Pearson (Prentice Hall)	Pearson Earth Science	0.30	0.31	0.30
Earth Science Total			*0.39*	*0.46*	*0.41*
Integrated	Its About Time	**Coordinated Science**	0.55	0.86	0.64
	Kendall/Hunt (BSCS)	**Science: An Inquiry Approach**	0.74	0.86	0.77
	LAB-AIDS Inc.	**Science and Sustainability**	0.42	0.74	0.51
	Pearson (Prentice Hall)	Conceptual Integrated Science	0.48	0.40	0.46
Integrated Total			*0.53*	*0.72*	*0.59*

High School Content Threshold					
Course	**Publisher**	**Program**	**Standards Alignment**	**Program Coherence**	**Threshold**
Physical Science	CPO Science	**Foundations of Physical Science**	0.73	0.71	0.73
	Glencoe	Glencoe Physical Sci w/ Earth Sci	0.51	0.47	0.50
	Glencoe	Glencoe Physical Science	0.52	0.51	0.52
	Holt McDougal	**Holt Physical Science**	0.61	0.58	0.60
	Holt McDougal	Holt Physical, Earth & Space	0.51	0.43	0.49
	Its About Time	**Active Physical Science**	0.65	0.75	0.68
	McGraw-Hill/Wright	McGraw-Hill Physical Science	0.47	0.50	0.48
	Pearson (Prentice Hall)	Conceptual Physical Science	0.40	0.40	0.40
	Pearson (Prentice Hall)	Pearson Physical Science	0.51	0.33	0.46
Physical Science Total			0.55	0.52	0.54
Physics	CPO Science	**Foundations of Physics**	0.59	0.69	0.62
	CPO Science	**Physics: A First Course**	0.62	0.49	0.58
	Glencoe	Glencoe Physics	0.55	0.42	0.51
	Holt McDougal	**Holt Physics**	0.65	0.40	0.58
	Its About Time	**Active Physics**	0.83	0.89	0.85
	Pearson (Prentice Hall)	**Conceptual Physics**	0.51	0.54	0.52
Physics Total			*0.63*	*0.57*	*0.61*

2.8 Next Steps

OSPI delivered initial recommendations to the SBE on June 30, 2009. The SBE has two months to review and comment on the initial recommendations. The SBE Science Panel will convene to discuss the initial recommendations and provide input to the SBE.

By September 1, 2009, the SBE will present their comments to OSPI. Superintendent Dorn will carefully consider their input and make his final recommendations after September 1.

OSPI will publish a report with final recommendations in September 2009.

3 Results

All of the dashboard charts in this section use the same legend, which is shown below.

Legend	
0.80 - 1.00	●
0.60 - 0.79	◕
0.40 - 0.59	◑
0.20 - 0.39	◔
0.00 - 0.19	○

3.1 *Elementary*

3.1.1 Content (Standards Alignment and Program Coherence)

	Elementary Content Measure						
Program Name	**SY**	**IN**	**AP**	**PS**	**ES**	**LS**	**All**
Experience Science	◔	◔	○	◑	◑	◑	◑
FOSS (K-5)	◑	◕	◑	◑	◔	◑	◑
Science - Diamond Edition	◑	◑	◑	◕	◑	◕	◑
Science Companion	◑	◕	◑	◕	◑	◑	◑
Science: A Closer Look	◔	◑	◑	◕	◕	◕	◑
STC	◑	◕	◕	◑	◔	◑	◑
Grand Total	◑	◕	◑	◑	◑	◑	◑

Figure 3.Elementary Standards Alignment Measures.

	Elementary Program Coherence						
Program Name	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**All**
Experience Science	◑	◑	◑	◔	◑	◔	◑
FOSS (K-5)	●	◕	●	◕	◕	◑	◕
Science - Diamond Edition	◕	◕	◑	◑	●	◑	◕
Science Companion	●	●	●	◕	◕	◑	◕
Science: A Closer Look	◕	◕	◕	◑	◕	◑	◕
STC	●	◕	●	●	●	◔	◕
Grand Total	◕	◕	◕	◕	◕	◑	◕

Figure 4. Elementary Program Coherence.

Elementary (K-1) Detailed Content Results							
Item	Experience Science	FOSS (K-5)	Science - Diamond Edition	Science Companion	Science: A Closer Look	STC	Grand Total
K-1 SYSA	◑	◕	◑	◕	◑	◑	◑
K-1 SYSB	○	◔	◔	◑	◔	○	◔
K-1 INQA	◕	●	◕	●	●	●	●
K-1 INQB	◔	○	◕	◑	◕	◔	◑
K-1 INQC	◔	●	◕	●	●	●	◕
K-1 INQD	◑	●	◕	●	◕	●	◕
K-1 INQE	○	◔	◔	◔	◑	◑	◔
K-1 INQF	◔	○	◔	◔	◑	◑	◔
K-1 APPA	○	◔	◑	●	◕	◑	◑
K-1 APPB	○	◑	◑	◕	◑	◔	◑
K-1 APPC	○	◑	◔	◑	◕	◔	◔
K-1 APPD	◔	○	◔	◔	◑	◑	◔
K-1 PS1A	◔	●	◕	◕	●	○	◑
K-1 PS1B	○	◔	◕	●	◕	○	◑
K-1 PS1C	◔	◔	◕	●	●	○	◑
K-1 PS1D	◕	◔	◕	●	◕	○	◑
K-1 PS2A	◔	●	◕	●	◑	◕	◕
K-1 PS2B	◔	◕	◕	●	◑	◕	◕
K-1 ES1A	○	◔	◑	◔	●	○	◔
K-1 ES1B	○	◑	◑	◕	◕	○	◑
K-1 ES1C	○	◔	◕	◕	◑	○	◔
K-1 ES2A	○	◑	◔	◕	◑	○	◔
K-1 ES2B	○	●	◕	◑	◕	◕	◑
K-1 ES2C	○	●	◑	◕	◕	◕	◑
K-1 LS1A	○	○	○	◕	○	◕	◔
K-1 LS1B	◕	●	◕	●	◕	◕	◕
K-1 LS1C	◕	◔	◑	◕	●	◕	◕
K-1 LS1D	◔	◕	◕	●	◑	◕	◕
K-1 LS1E	◔	◕	◕	●	◕	◕	◕
K-1 LS1F	◕	●	◑	◑	◕	○	◕
K-1 LS2A	◔	●	◕	●	●	◕	◕
K-1 LS2B	◑	●	◕	◕	◕	◑	◕
K-1 LS2C	◔	○	◑	○	◕	◑	◔
K-1 LS3A	◑	◔	◕	●	●	◔	◑
K-1 LS3B	◔	◔	◕	◕	◕	◕	◑
K-1 LS3C	◔	◑	◕	●	●	◕	◕
Total	◔	◑	◑	◕	◕	◑	◑

Figure 5. Average Score by Standard for Elementary (K-1) Programs.

Elementary (2-3) Detailed Content Results							
Item	Experience Science	FOSS (K-5)	Science - Diamond Edition	Science Companion	Science: A Closer Look	STC	Grand Total
2-3 SYSA	◔	◕	◔	◕	◔	◑	◑
2-3 SYSB	○	◔	◔	◕	◔	◑	◔
2-3 SYSC	◔	◔	◔	◕	◔	◔	◔
2-3 SYSD	◔	◕	○	◕	◔	◑	◑
2-3 SYSE	◕	◑	◑	◕	◔	◔	◑
2-3 INQA	◑	●	◕	●	◑	●	◕
2-3 INQB	◑	●	◕	◕	◑	●	◕
2-3 INQC	◔	◑	◕	◕	◑	◔	◑
2-3 INQD	◕	●	●	●	◑	●	●
2-3 INQE	◔	◕	◕	●	◕	●	◕
2-3 INQF	◔	●	◕	◕	◔	◕	◕
2-3 INQG	◔	●	◑	◕	◔	◕	◑
2-3 APPA	◔	◑	◔	◕	◔	◑	◑
2-3 APPB	◔	◕	◑	◕	◔	●	◑
2-3 APPC	○	◕	◔	○	◔	◑	◔
2-3 APPD	◑	◑	◔	◕	◔	◑	◑
2-3 APPE	○	◑	◔	◕	◔	◔	◑
2-3 PS1A	◑	◕	◑	◕	◕	◔	◑
2-3 PS1B	◔	◕	◕	◕	◕	◔	◑
2-3 PS1C	◔	◑	◕	◕	◕	◔	◑
2-3 PS1D	◔	◔	◕	◕	◕	◔	◑
2-3 PS2A	◑	◕	◕	●	◕	●	◕
2-3 PS2B	◔	◕	◑	●	◑	◕	◑
2-3 PS2C	◕	●	◕	●	◕	●	◕
2-3 PS2D	◑	◕	○	●	◑	◕	◑
2-3 PS3A	◔	◔	◕	◔	◑	◔	◑
2-3 ES1A	●	●	◕	●	◔	○	◕
2-3 ES2A	◔	◕	◔	●	◑	◕	◑
2-3 ES2B	◔	◕	◑	◕	◑	◑	◑
2-3 ES2C	◑	●	◕	◕	◕	◔	◕
2-3 LS1A	◑	●	●	●	◕	●	◕
2-3 LS1B	◑	●	◕	●	◕	●	●
2-3 LS2A	◔	◔	●	◕	◕	◔	◑
2-3 LS2B	◔	◔	◕	○	◕	◑	◑
2-3 LS2C	◔	◔	◑	○	◕	◔	◔
2-3 LS2D	◔	◔	◑	◕	◑	◑	◑
2-3 LS3A	○	◕	◑	◕	◑	○	◑
2-3 LS3B	◔	◑	◕	●	◕	○	◑
2-3 LS3C	◕	○	◑	●	◕	○	◑
2-3 LS3D	◑	○	◕	◕	◕	○	◑
2-3 LS3E	◔	◔	◕	◔	◑	○	◔
Total	◔	◑	◑	◕	◑	◑	◑

Figure 6. Average Score by Standard for Elementary (2-3) Programs.

Elementary (4-5) Detailed Content Results							
Item	Experience Science	FOSS (K-5)	Science - Diamond Edition	Science Companion	Science: A Closer Look	STC	Grand Total
4-5 SYSA	○	◑	◕	◔	◑	◑	◑
4-5 SYSB	◔	◔	◕	◔	◑	◑	◑
4-5 SYSC	◔	◔	◑	◔	◑	◑	◔
4-5 SYSD	○	○	◑	◔	◔	◑	◔
4-5 INQA	◔	◕	◑	◕	◕	●	◕
4-5 INQB	◕	◕	◔	◕	◕	●	◕
4-5 INQC	○	●	◑	●	◑	◕	◑
4-5 INQD	◑	●	◑	●	◕	●	◕
4-5 INQE	○	◕	◔	◔	◑	●	◑
4-5 INQF	◑	◕	◕	●	◕	●	◕
4-5 INQG	◑	◑	◑	◕	◑	●	◕
4-5 INQH	◑	◕	◑	◕	◕	●	◕
4-5 INQI	◔	◔	◔	◔	◔	◑	◔
4-5 APPA	◔	◑	◕	●	◕	●	◕
4-5 APPB	○	○	◔	◑	◑	◕	◔
4-5 APPC	◔	◑	◑	◔	◑	●	◑
4-5 APPD	◔	◕	◑	◑	◔	●	◑
4-5 APPE	◔	◕	◔	◕	◔	●	◑
4-5 APPF	○	◑	◑	◑	◑	●	◑
4-5 APPG	◔	◔	◑	◕	◑	◕	◑
4-5 APPH	○	◔	●	◕	◕	●	◑
4-5 PS1A	◔	◑	◕	○	◕	●	◑
4-5 PS1B	◑	○	◑	○	◑	◕	◑
4-5 PS2A	◕	◑	◕	●	●	◑	◕
4-5 PS2B	◑	◑	◑	◕	◕	◑	◑
4-5 PS2C	◔	◑	◔	◕	◑	○	◔
4-5 PS3A	◕	◕	◕	●	◕	◕	◕
4-5 PS3B	◕	◕	◑	●	◕	◕	◕
4-5 PS3C	◕	◑	◕	●	◕	○	◑
4-5 PS3D	◑	◔	◕	◑	◕	◕	◑
4-5 PS3E	◕	◔	◑	◕	◕	●	◕

continued							
Item	Experience Science	FOSS (K-5)	Science - Diamond Edition	Science Companion	Science: A Closer Look	STC	Grand Total
4-5 ES1A	◕	◔	◑	◔	◑	○	◔
4-5 ES1B	◕	○	◕	◕	◕	○	◑
4-5 ES1C	●	○	◕	◔	◕	○	◑
4-5 ES1D	◕	◔	◕	◑	◕	○	◑
4-5 ES2A	◑	○	◕	◔	◑	◑	◑
4-5 ES2B	◕	◔	●	◕	◕	◑	◕
4-5 ES2C	◕	◑	◕	●	◕	◕	◕
4-5 ES2D	◕	◔	◕	◑	◕	◑	◑
4-5 ES2E	◕	○	◔	○	◕	◔	◔
4-5 ES2F	◕	○	◑	◔	◑	◑	◑
4-5 ES3A	◑	○	◑	○	◑	○	◔
4-5 ES3B	◑	○	◔	○	◕	○	◔
4-5 LS1A	◑	◑	◕	◔	◕	○	◑
4-5 LS1B	◕	◕	◕	◕	◕	◔	◑
4-5 LS1C	◕	◕	◑	◔	◕	◑	◕
4-5 LS1D	◑	◕	◑	◔	◕	◑	◑
4-5 LS1E	◕	◔	◔	◔	◔	◑	◔
4-5 LS2A	◕	◑	◑	○	◕	●	◑
4-5 LS2B	◕	◑	◕	◑	●	◕	◕
4-5 LS2C	●	◕	◕	◕	◕	◕	◕
4-5 LS2D	◕	◕	◑	○	◕	◑	◑
4-5 LS2E	◕	◔	◑	◔	◕	◑	◑
4-5 LS2F	◕	◔	◕	◑	◕	◕	◕
4-5 LS3A	◕	◕	◑	○	◑	◑	◑
4-5 LS3B	◑	○	◑	○	◕	◔	◔
4-5 LS3C	◔	○	◔	○	◔	◔	◔
4-5 LS3D	◕	○	◑	○	◑	○	◔
Total	◑	◑	◑	◑	◕	◑	◑

Figure 7. Average Score by Standard for Elementary (4-5) Programs.

3.1.2 Key Program Elements

All Elementary School Results for Key Program Elements								
Scale	**Item**	**Experience Science**	**FOSS (K-5)**	**Science - Diamond Edition**	**Science Companion**	**Science: A Closer Look**	**STC**	**Grand Total**
Student Learning	S1	◑	◕	◑	◕	◑	●	◕
	S2	◑	●	◕	●	◕	●	◕
	S3	◕	●	●	●	◕	●	●
	S4	◑	●	◑	●	◑	●	◕
	S5	◑	●	◑	◕	◑	●	◕
	S6	◑	◕	◑	◕	◑	●	◕
Student Learning Total		◑	●	◕	●	◕	●	◕
Facilitating Instruction	F1	◑	◕	◕	◕	◕	◕	◕
	F2	◔	◕	◑	◕	◑	◕	◑
	F3	◑	◑	◕	◑	◕	◑	◑
	F4	◔	◕	◕	●	◕	◕	◕
	F5	◑	◕	●	◑	◕	◕	◕
	F6	◕	●	◕	◕	◕	●	◕
Facilitating Instruction Total		◑	◕	◕	◕	◕	◕	◕
Equity and Accessibility	E1	◔	◔	◕	◔	◕	◑	◑
	E2	◔	◕	◕	◑	◕	◕	◑
	E3	○	◑	◕	◔	◑	◑	◑
	E4	◑	◕	●	◑	◕	●	◕
	E5	◔	◕	◕	◑	◕	●	◕
	E6	◔	◕	◕	◑	◕	●	◕
Equity and Accessibility Total		◔	◕	◕	◑	◕	◕	◑
Assessment	A1	◔	◑	◕	◕	◑	◕	◑
	A2	◔	◕	◕	◕	◑	◕	◕
	A3	◔	◑	◑	◕	◔	◕	◑
	A4	◑	◕	◕	●	◑	◕	◕
	A5	◔	◕	◑	◕	◑	◕	◑
	A6	◑	◕	◕	●	◑	◕	◕
Assessment Total		◔	◕	◕	◕	◑	◕	◕

Figure 8. Elementary Key Program Elements.

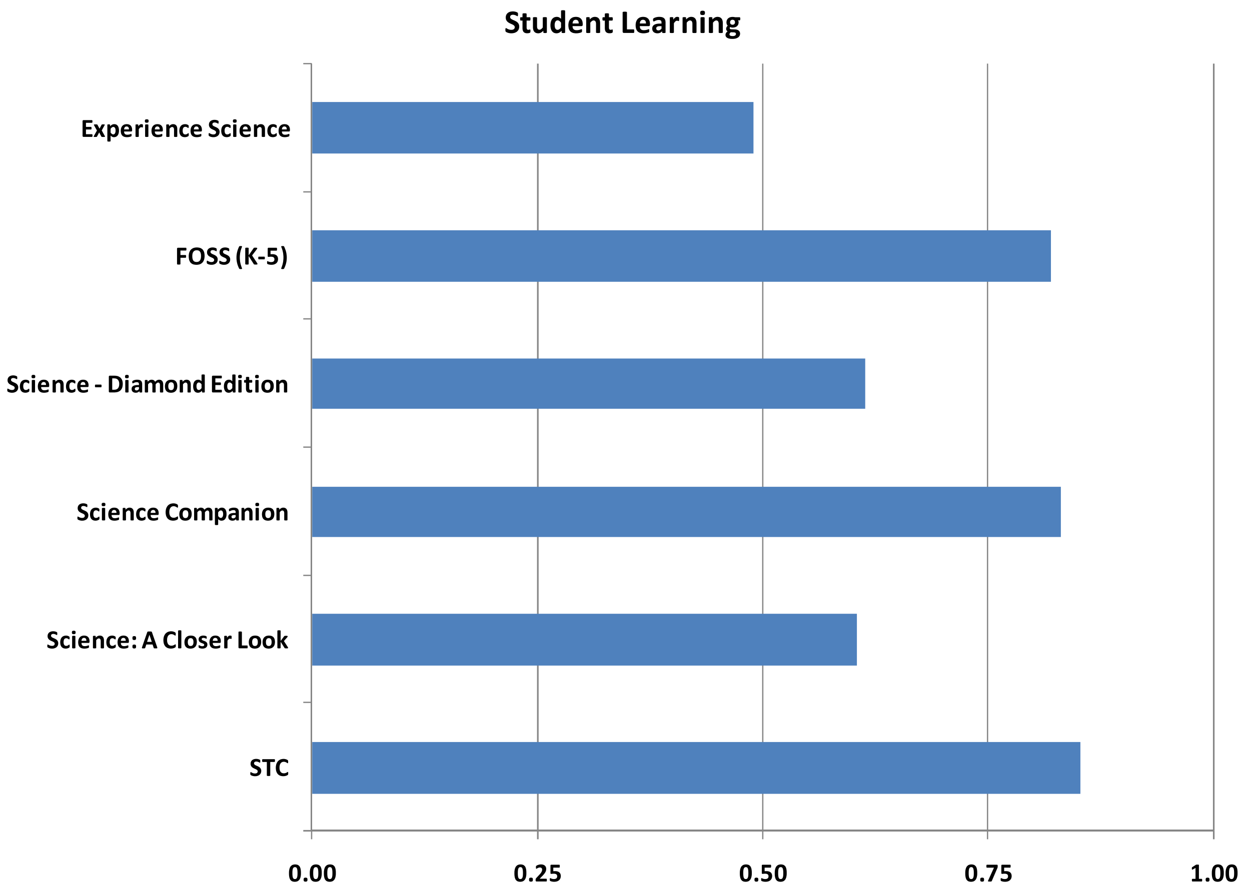


Figure 9. Elementary Student Learning.

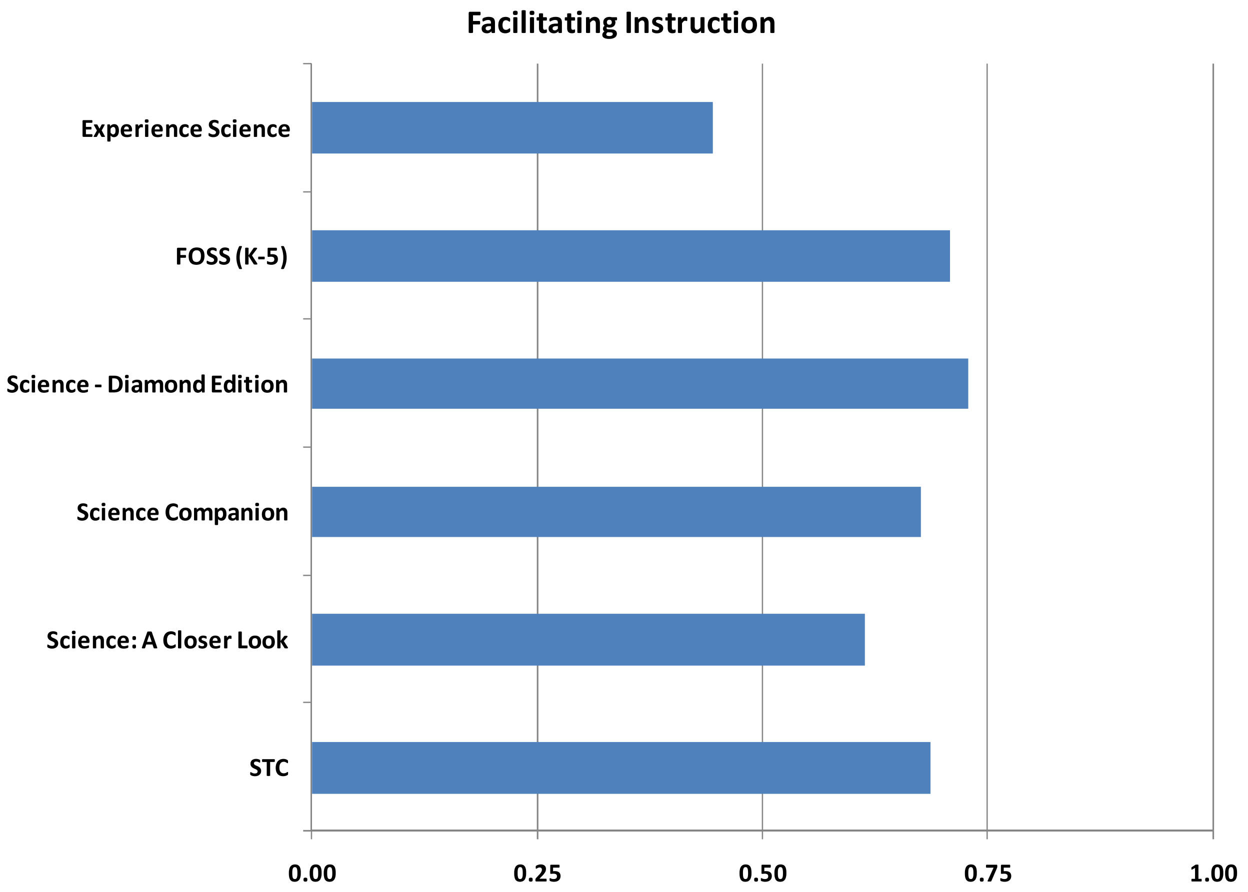


Figure 10. Elementary Facilitating Instruction.

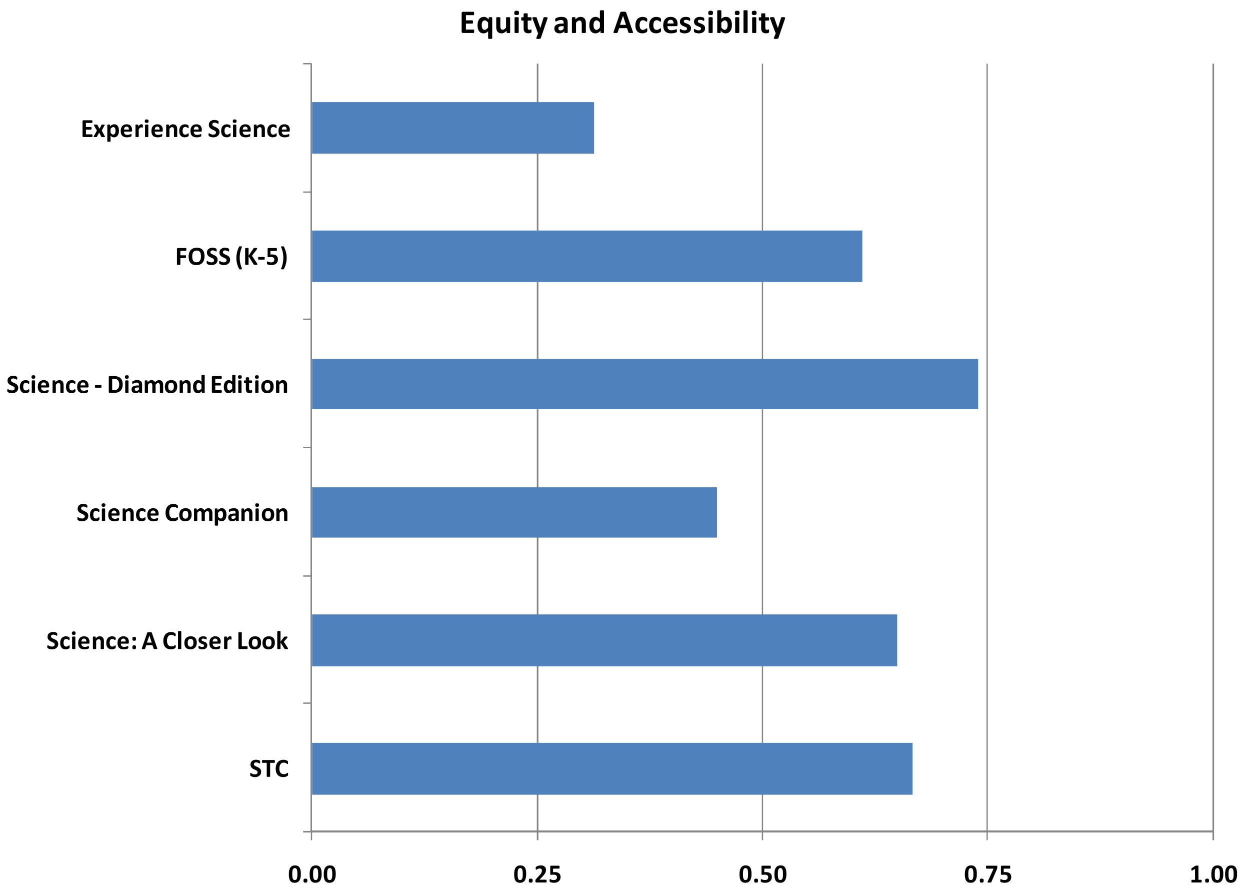


Figure 11. Elementary Equity and Accessibility.

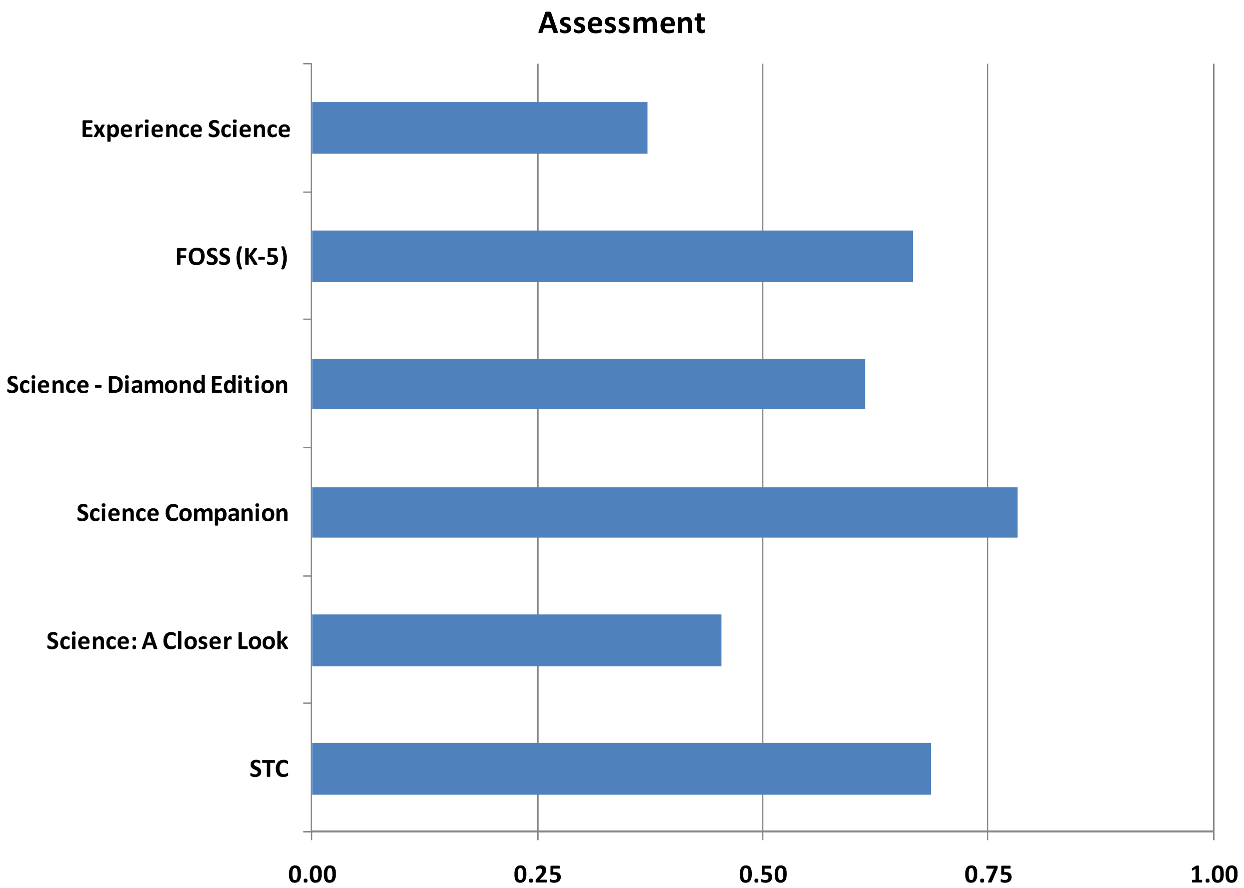
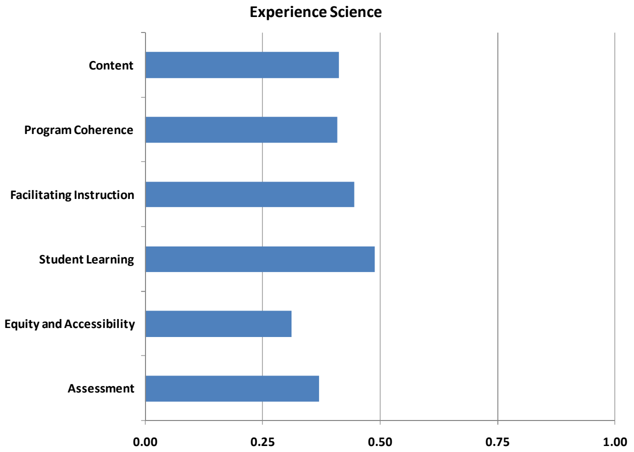
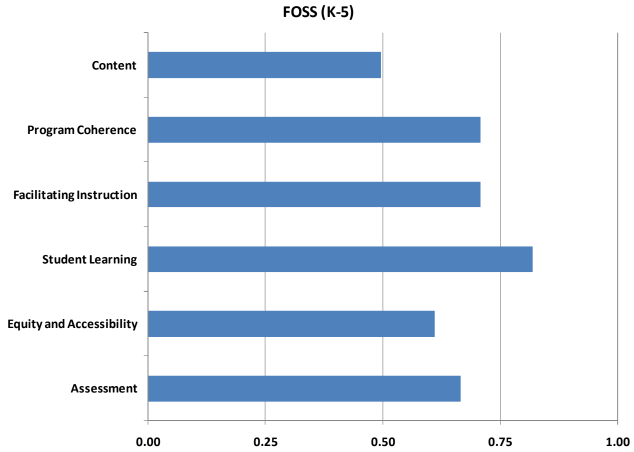
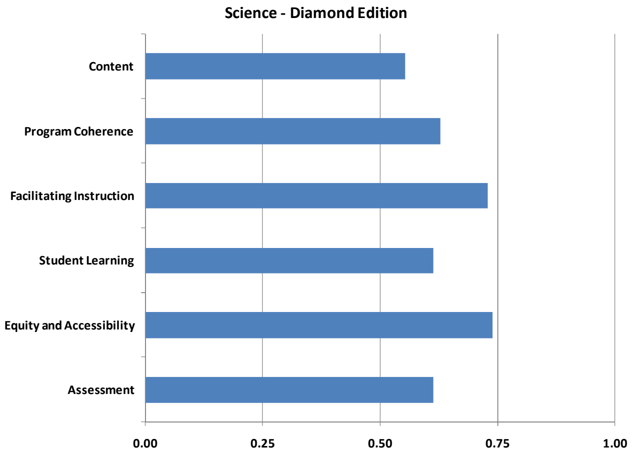


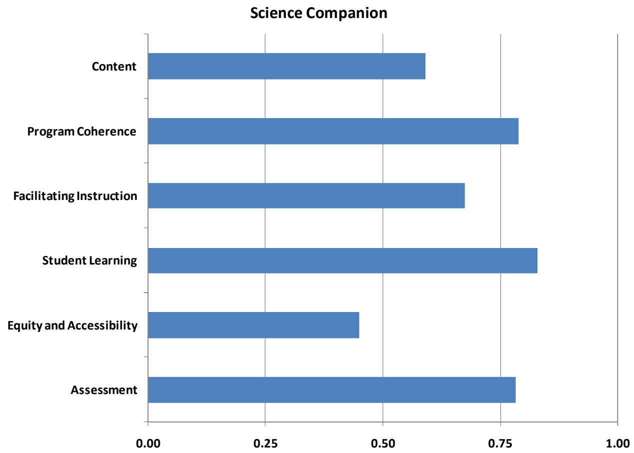
Figure 12. Elementary Assessment.

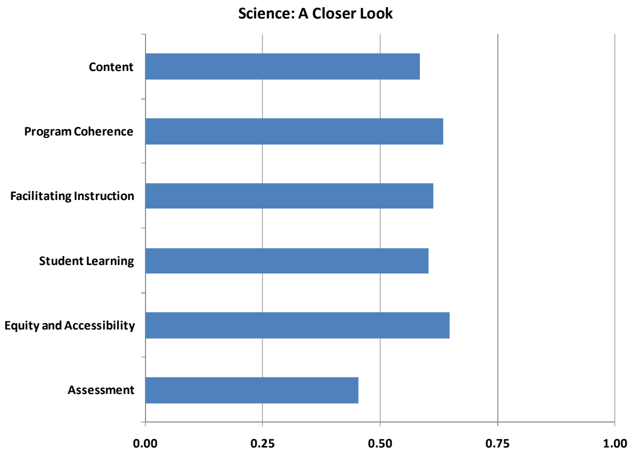
3.1.3 Individual Publisher Series

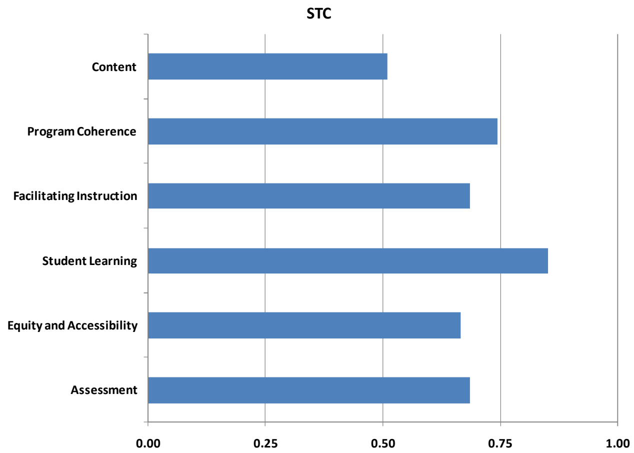












3.2 Middle School

3.2.1 Content (Standards Alignment and Program Coherence)

Program Name	Middle School Content Measure						
	SY	IN	AP	PS	ES	LS	All
FOSS (6-8)	◕	◕	◕	◕	◕	●	◕
Glencoe Blue/Green/Red	◔	◔	◑	◔	◔	◑	◔
Glencoe Earth/Life/Physical	◔	◑	◔	◕	◕	●	◑
Holt Science & Technology	◔	◑	◑	◑	◑	◑	◑
IAT: Earth/Life/Physical Series	◕	◕	◑	●	◕	◕	◕
KH: Investigating Series	◔	◑	◑	◔	◑	◑	◔
LA: Issues Series	◑	◕	◑	◕	●	◕	◕
ML: Science Modules	◑	◕	◕	●	●	●	◕
Science - Diamond Edition	◑	◑	◑	◔	◑	◑	◑
Science Explorer	◕	●	●	●	●	●	●
STC Earth/Life/Physical Series	◔	◑	◔	●	◑	◔	◑
SCI: Introductory Physical Science	○	◑	○	◑			◔
Grand Total	◑	◑	◑	◕	◕	◕	◑

Figure 13. Middle School Standards Alignment Measures.

Program Name	Middle School Program Coherence						
	P1	P2	P3	P4	P5	P6	All
FOSS (6-8)	●	◕	●	●	◕	●	●
Glencoe Blue/Green/Red	◑	◑	◔	◑	◕	◔	◑
Glencoe Earth/Life/Physical	◕	◕	◔	◑	◑	◑	◑
Holt Science & Technology	◑	◑	◑	◑	◑	◔	◑
IAT: Earth/Life/Physical Series	●	●	●	◕	◑	◕	◕
KH: Investigating Series	◕	◑	◕	◕	◑	◕	◕
LA: Issues Series	●	●	●	●	◕	◕	●
ML: Science Modules	●	●	●	●	●	◕	●
SCI: Introductory Physical Science	◑	◑	◕	◑	◔	◑	◑
Science - Diamond Edition	◕	◑	◔	◕	◑	◑	◑
Science Explorer	●	●	●	●	●	◔	●
STC Earth/Life/Physical Series	●	◕	●	◕	◑	◕	◕
Grand Total	◕	◕	◕	◕	◑	◕	◕

Figure 14. Middle School Program Coherence.

Middle School Detailed Content Results

Item	FOSS (6-8)	Glencoe Blue/Green/Red	Glencoe Earth/Life/Physical	Holt Science & Technology	IAT: Earth/Life/Physical Series	KH: Investigating Series	LA: Issues Series	ML: Science Modules	Science - Diamond Edition	Science Explorer	STC Earth/Life/Physical Series	SCI: Introductory Physical Science	Grand Total
6-8 SYSA	◕	◔	◑	◔	◕	◑	◑	●	◕	◕	◑	○	◑
6-8 SYSB	◕	○	◔	◔	◑	◔	◑	◕	◕	◕	○	○	◔
6-8 SYSC	◕	◔	◔	◔	◕	◔	◑	◔	◑	◕	○	○	◑
6-8 SYSD	◕	○	◔	○	◕	○	◔	◔	◔	◑	◔	○	◔
6-8 SYSE	◕	○	◔	◔	◕	◔	◑	◑	◑	◑	◔	○	◔
6-8 SYSF	◕	◔	◔	◔	●	◑	◕	◕	◔	●	◔	○	◑
6-8 INQA	◕	◔	◔	◕	◕	◑	◑	●	◔	◕	◑	◑	◑
6-8 INQB	◑	◑	◕	◕	●	◔	●	●	◔	●	◕	◑	◕
6-8 INQC	●	◑	◔	◑	●	◕	◕	◕	◑	●	●	◕	◕
6-8 INQD	◕	◔	◔	◑	●	◑	◑	◕	◑	◑	◕	◔	◑
6-8 INQE	●	◑	◕	◑	●	◑	●	●	◕	●	◕	◑	◕
6-8 INQF	◑	◔	◑	◑	●	◑	◕	◕	◕	●	◕	◑	◕
6-8 INQG	◑	◔	◑	◔	●	◑	◕	◕	◑	●	◔	◑	◑
6-8 INQH	◕	○	◔	○	◕	◑	◕	◑	◔	◕	◑	◔	◑
6-8 INQI	◑	○	○	◔	○	○	◔	◑	◔	●	○	○	◔
6-8 APPA	◕	◕	◑	◑	◑	◑	◕	●	◑	●	◑	○	◑
6-8 APPB	◕	◑	◕	◕	◔	◑	◕	●	◑	●	◑	○	◑
6-8 APPC	◑	◔	◑	◑	◑	◑	◕	●	◑	●	◑	○	◑
6-8 APPD	◕	◑	◔	◔	◕	◑	◕	◕	◑	●	◔	○	◑
6-8 APPE	●	◑	◔	◑	◑	◑	◕	◕	◑	●	◔	○	◑
6-8 APPF	◑	◑	◔	◔	◕	◔	◕	◕	◑	●	◔	○	◑
6-8 APPG	○	○	○	◑	◔	○	○	◑	○	◑	○	○	○
6-8 APPH	◕	◔	◔	◕	◔	◔	○	◕	◑	●	◔	○	◔
6-8 PS1A	●	◕	◕	◕	●	◑	●	●	◔	●	●	◕	●
6-8 PS1B	●	◑	◕	◑	●	○	◕	●	◑	●	●	◑	◕
6-8 PS1C	●	◔	◕	◑	●	○	◑	●	◔	●	●	◑	◕
6-8 PS1D	◕	◔	◑	◑	●	○	◕	●	◑	●	◕	○	◑
6-8 PS2A	◕	◔	◕	◑	◑	○	●	●	◑	●	●	●	◕
6-8 PS2B	●	○	◕	◑	●	○	◕	●	◑	◕	●	◕	◕
6-8 PS2C	●	◔	●	◕	●	◔	◕	●	◑	●	◕	◕	◕
6-8 PS2D	◕	◔	◑	◕	●	○	◕	●	◑	●	●	◕	◕
6-8 PS2E	●	◔	●	◕	●	◔	◔	◕	◔	●	◕	◔	◕
6-8 PS2F	◕	◔	◕	◔	●	○	◑	◕	◔	◑	●	◕	◑
6-8 PS3A	●	◑	●	◕	●	◑	●	●	◑	●	●	◔	◕
6-8 PS3B	●	◔	●	◕	◑	◔	◑	●	◑	●	◑	◔	◕
6-8 PS3C	◕	○	◑	◑	●	◔	◑	●	◔	◕	◑	○	◑
6-8 PS3D	◕	◔	●	○	●	◑	○	◕	○	◕	◕	○	◑
6-8 PS3E	◑	◔	◕	◔	●	◑	●	◕	◔	●	●	○	◕
6-8 PS3F	○	◔	●	○	●	○	◔	◕	◑	●	◕	◕	◑

Figure 15. Average Score by Standard for Middle School Programs (part 1 of 2).

Middle School Detailed Content Results (continued)													
Content Item	FOSS (6-8)	Glencoe Blue/Green/Red	Glencoe Earth/Life/Physical	Holt Science & Technology	IAT: Earth/Life/Physical Series	KH: Investigating Series	LA: Issues Series	ML: Science Modules	Science - Diamond Edition	Science Explorer	STC Earth/Life/Physical Series	SCI: Introductory Physical Science	Grand Total
6-8 ES1A	◕	◑	◕	◑	◕	◕	◕	◕	◑	●	●		◕
6-8 ES1B	◑	◑	◕	◑	●	◕	◕	●	◕	●	●		◕
6-8 ES1C	◕	◑	◕	◑	◕	◕	◕	◕	◕	●	●		◕
6-8 ES1D	◔	◔	◑	◑	●	○	●	◑	◑	●	◕		◑
6-8 ES1E	○	◔	◕	◔	◕	◔	◑	◕	◔	●	◔		◑
6-8 ES2A	●	◑	◕	◑	◑	◑	●	◕	◑	●	◑		◕
6-8 ES2B	◕	◔	●	◑	◕	◑	●	●	◔	●	◕		◕
6-8 ES2C	●	◑	◔	◕	●	◕	●	●	◑	●	◑		◕
6-8 ES2D	◑	○	◔	○	◕	○	◑	◕	◔	◔	○		◔
6-8 ES2E	◔	◑	●	◕	●	◕	●	◕	◔	●	◕		◕
6-8 ES2F	○	◕	●	◑	●	◕	●	◕	◑	●	◕		◕
6-8 ES2G	◕	◔	●	◑	●	◔	●	●	◑	●	◑		◕
6-8 ES2H	●	◔	●	◕	●	◔	●	●	◔	◕	◑		◕
6-8 ES3A	●	◔	◕	◑	●	◕	●	●	◑	●	○		◕
6-8 ES3B	●	◑	◕	◕	●	◔	●	●	◑	●	◕		◕
6-8 ES3C	◑	◑	◕	◕	◕	○	●	◕	◑	●	◔		◑
6-8 ES3D	◔	◔	●	◑	◕	◕	●	●	◑	●	◕		◕
6-8 ES3E	◕	◔	◑	◔	◔	○	◑	◕	◑	◕	○		◔
6-8 LS1A	◕	◑	●	◑	◕	◕	●	●	◕	●	◔		◕
6-8 LS1B	◕	◔	◑	◑	◔	○	◕	●	◑	●	◑		◑
6-8 LS1C	●	◕	◕	◑	◑	◔	◕	◕	◑	●	◑		◕
6-8 LS1D	●	◑	●	◑	◕	◕	●	●	◕	●	◕		◕
6-8 LS1E	◕	◔	◕	◔	◔	○	◑	●	◕	●	◑		◑
6-8 LS1F	○	◑	●	◑	◔	◑	◔	●	◑	●	◑		◑
6-8 LS2A	●	◑	●	◑	◕	○	◔	●	◕	●	◑		◕
6-8 LS2B	●	◑	◕	◑	◕	○	◕	●	◑	●	◔		◕
6-8 LS2C	●	◑	●	◑	◕	○	●	●	◑	●	◔		◕
6-8 LS2D	●	◔	●	◑	●	◔	●	●	◑	●	◔		◕
6-8 LS2E	●	◔	◔	◑	◕	◔	●	●	◔	●	○		◑
6-8 LS3A	●	◑	◕	◔	◔	◑	●	●	◔	●	◔		◕
6-8 LS3B	●	◑	●	◑	◕	●	●	●	◕	●	◑		◕
6-8 LS3C	●	◔	◕	◑	◕	◑	◕	●	◕	●	◑		◕
6-8 LS3D	●	◑	●	◕	◕	◑	◑	●	◕	●	◑		◕
6-8 LS3E	●	◑	●	◔	●	◕	●	●	◑	●	◑		◕
6-8 LS3F	●	◔	●	◔	●	◑	●	◕	◑	●	○		◑
6-8 LS3G	◕	◑	●	◑	◔	◕	●	◕	◔	●	○		◕
Total	◕	◔	◑	◑	◕	◔	◕	◕	◑	●	◑	◔	◑

Figure 16. Average Score by Standard for Middle School Programs (part 2 of 2).

3.2.2 Key Program Elements

Middle School Key Program Elements Detailed Results by Scale														
Scale	**Item**	**FOSS (6-8)**	**Glencoe Blue/Green/Red**	**Glencoe Earth/Life/Physical**	**Holt Science & Technology**	**IAT: Earth/Life/Physical Series**	**KH: Investigating Series**	**LA: Issues Series**	**ML: Science Modules**	**Science - Diamond Edition**	**Science Explorer**	**STC Earth/Life/Physical Series**	**SCI: Introductory Physical Science**	**Grand Total**
Student Learning	S1	●	◑	◑	◑	◕	◕	●	●	◑	●	●	◕	◕
	S2	●	◑	◑	◕	◕	●	●	●	◑	●	●	◑	◕
	S3	●	◑	●	◑	●	◑	◕	●	◑	●	●	◑	◕
	S4	●	◑	◑	◑	◕	◑	●	◕	◑	●	◕	◑	◕
	S5	●	◑	◕	◑	●	◕	◕	◕	◑	●	◕	◑	◕
	S6	●	◑	◑	◕	●	◕	●	●	◑	◕	◕	◑	◕
Student Learning Total		●	◑	◕	◑	●	◕	●	●	◑	●	◕	◑	◕
Facilitating Instruction	F1	●	◕	◕	◑	◕	◑	◕	●	◕	●	●	◑	◕
	F2	●	◔	◔	◔	◕	◑	◕	●	◑	◕	◕	◑	◕
	F3	◕	◑	◕	◕	◔	◑	◕	◕	◕	●	◑	○	◑
	F4	●	◔	◕	◔	◕	◑	◕	◕	◕	●	◑	◑	◕
	F5	●	●	◕	◕	◑	◑	◕	●	●	●	◑	○	◕
	F6	●	◕	◕	◑	◕	◕	●	◕	◕	●	●	◑	◕
Facilitating Instruction Total		●	◑	◕	◑	◕	◑	◕	●	◕	●	◕	◑	◕
Equity and Accessibility	E1	◑	◕	●	◕	◔	◔	◑	●	◕	●	◑	○	◑
	E2	◕	◑	◕	◑	◑	◑	◕	◕	●	●	◕	◔	◕
	E3	◔	◑	◕	◕	○	◔	◔	◕	◑	●	◔	○	◔
	E4	◕	●	●	◕	◕	◑	●	●	●	●	◕	○	◕
	E5	◕	●	◕	◕	◑	◑	◕	●	◕	●	◑	○	◕
	E6	◕	●	●	●	◕	◕	●	●	●	●	◑	◔	◕
Equity and Accessibility Total		◕	◕	◕	◕	◑	◑	◕	●	●	●	◑	○	◕
Assessment	A1	●	◔	◑	◔	◕	◑	◕	●	◕	◑	◕	◑	◕
	A2	◕	◑	◕	◔	◑	◑	◕	◕	◕	◑	◑	◑	◑
	A3	●	○	◔	◑	◕	◑	◕	●	◑	◑	◕	◔	◕
	A4	◕	◔	◑	◔	●	◑	◕	◕	◕	◕	◕	◔	◕
	A5	●	◔	◔	◔	◕	◕	◕	◕	◑	●	◕	◑	◕
	A6	◕	◑	◕	◑	◕	◑	◕	●	◕	◕	◕	◑	◕
Assessment Total		●	◔	◑	◔	◕	◑	◕	●	◕	◕	◕	◑	◕

Figure 17. Middle School Key Program Elements.

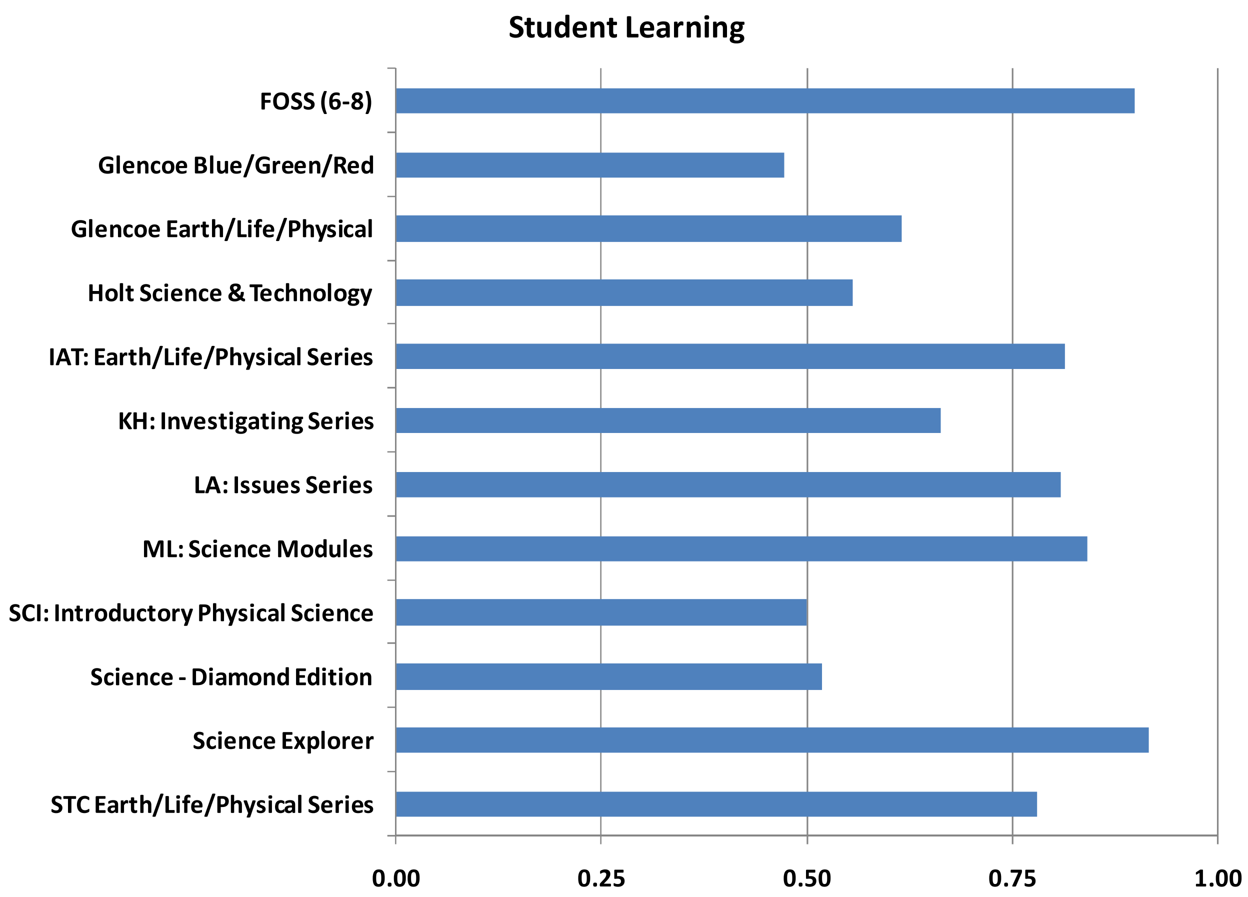


Figure 18. Middle School Student Learning.

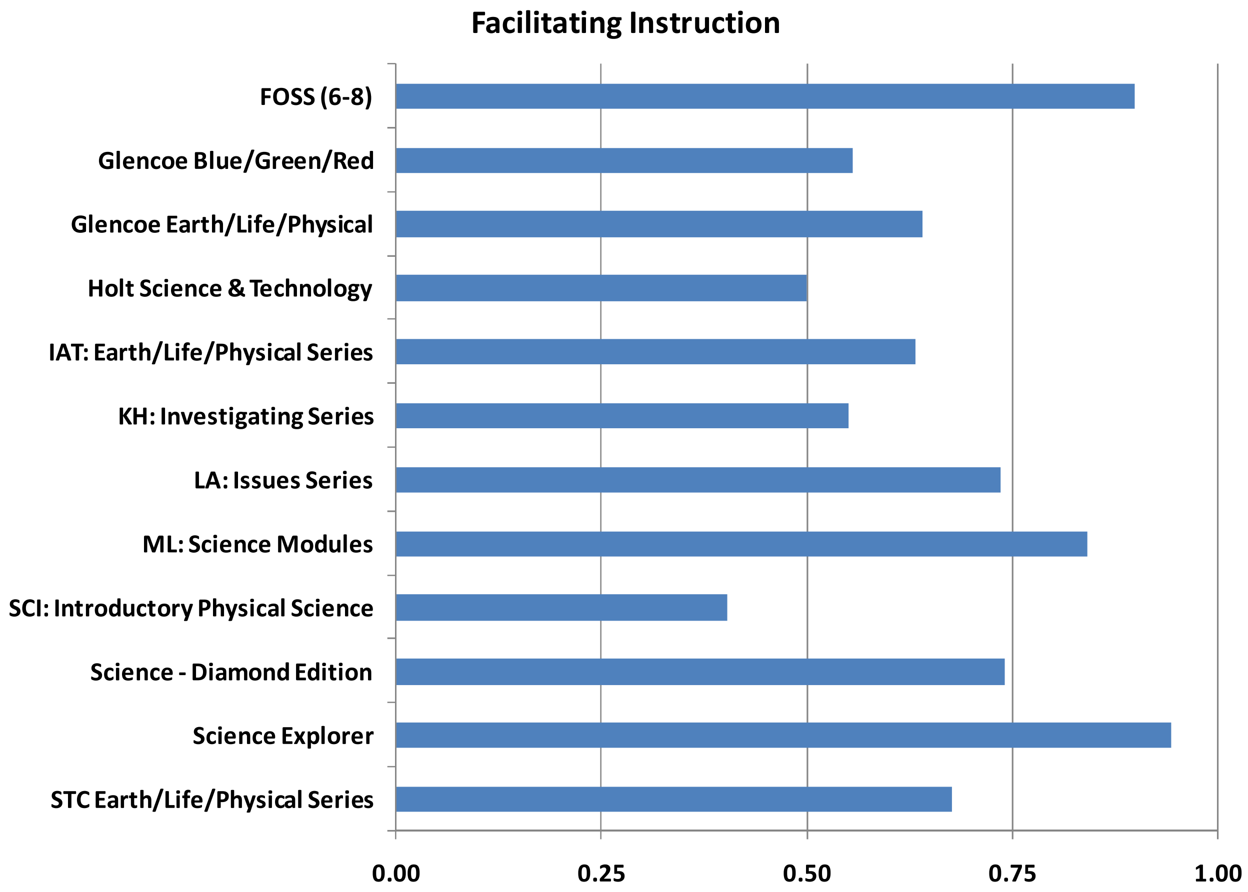


Figure 19. Middle School Facilitating Instruction.

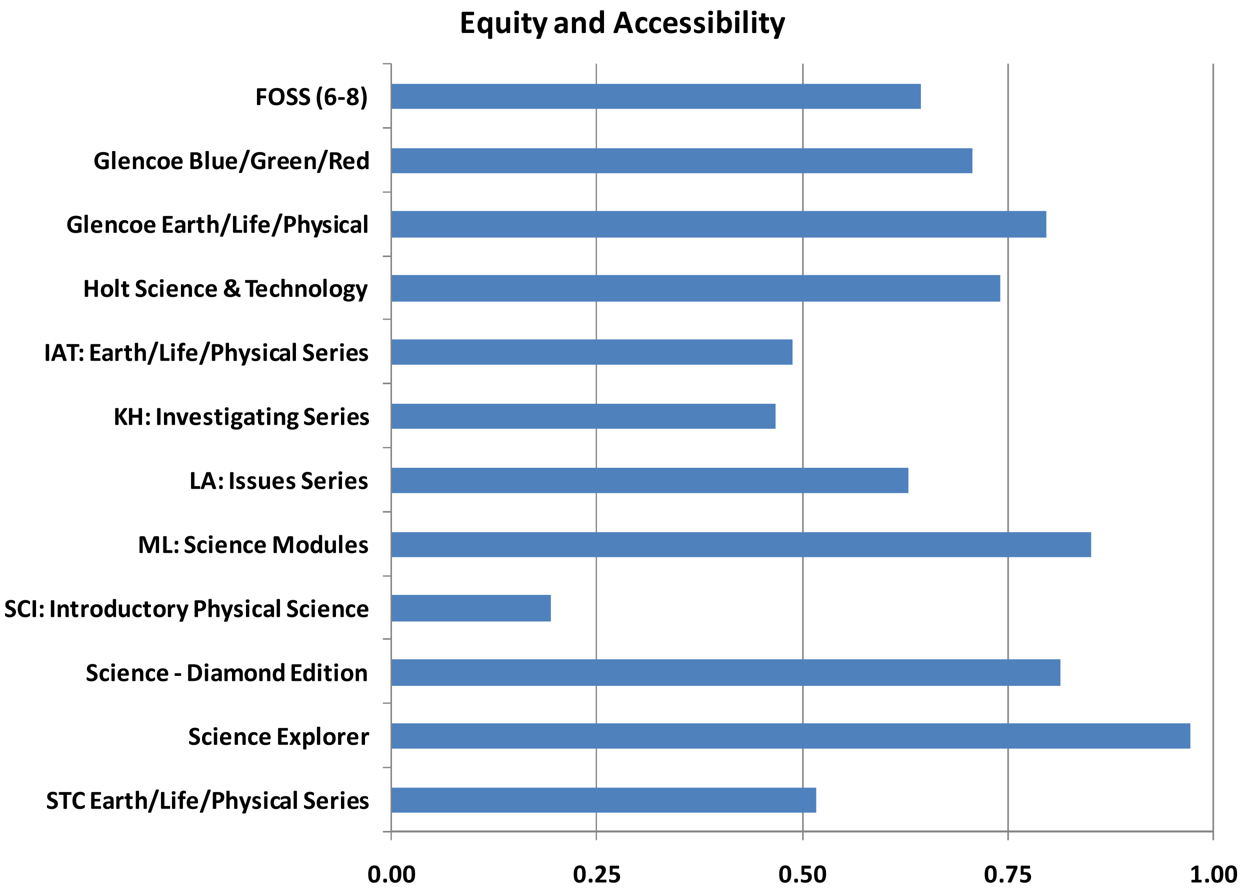


Figure 20. Middle School Equity and Accessibility.

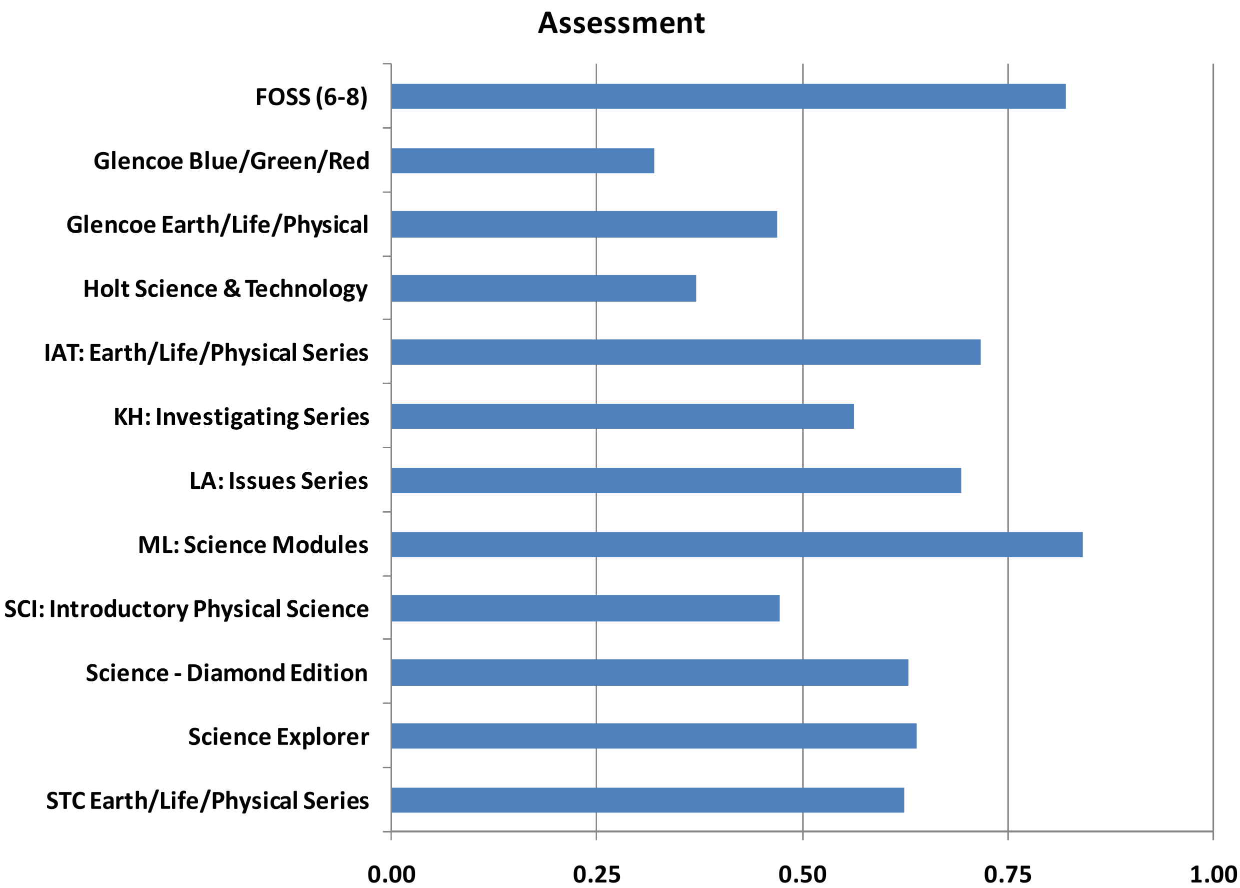
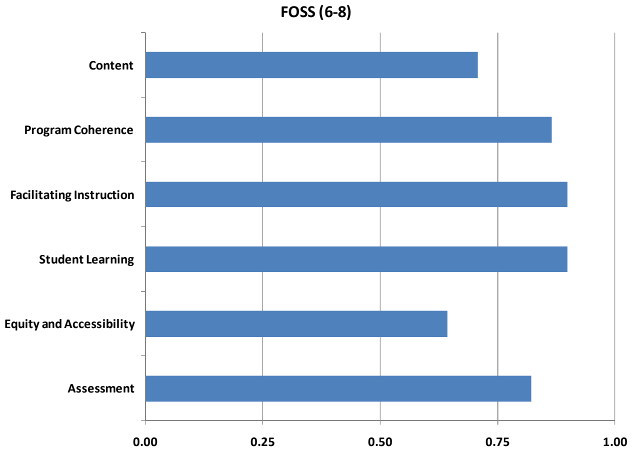
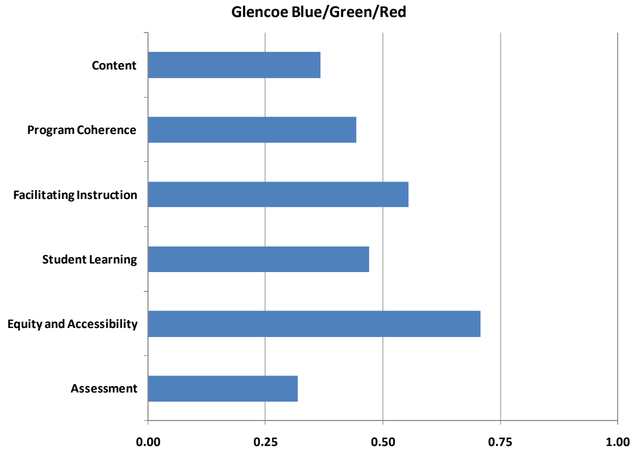
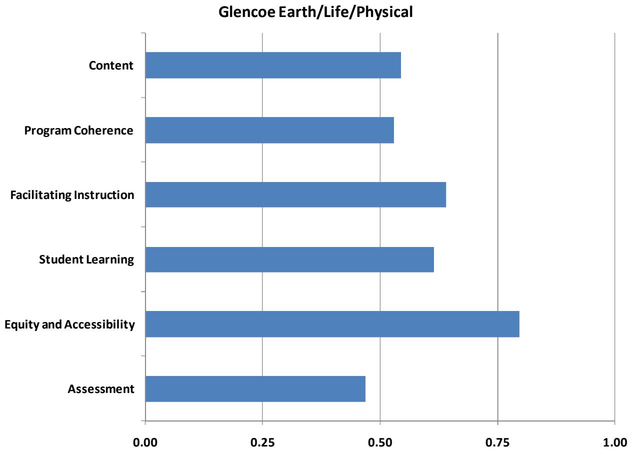


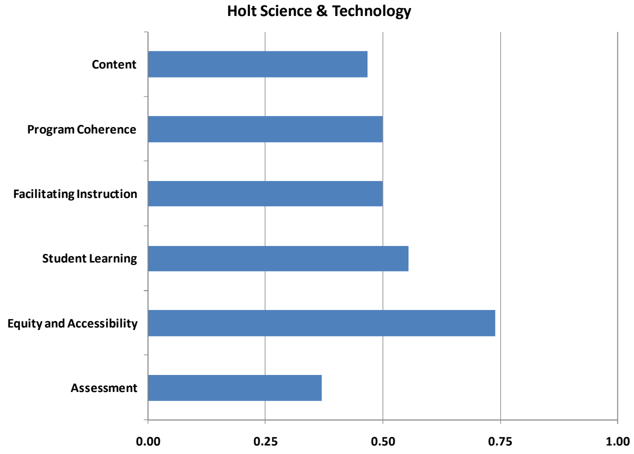
Figure 21. Middle School Assessment.

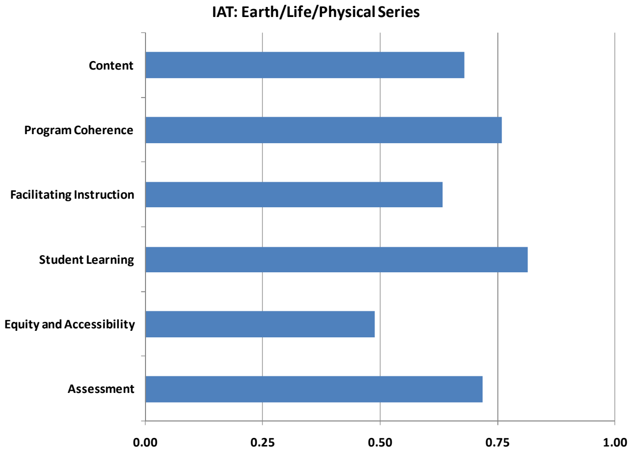
3.2.3 Individual Publisher Series

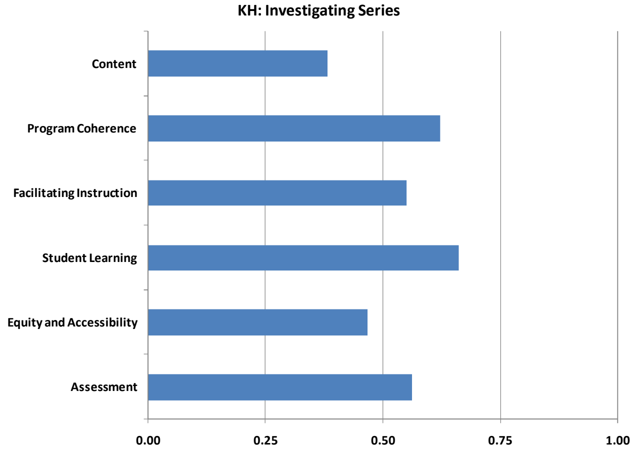


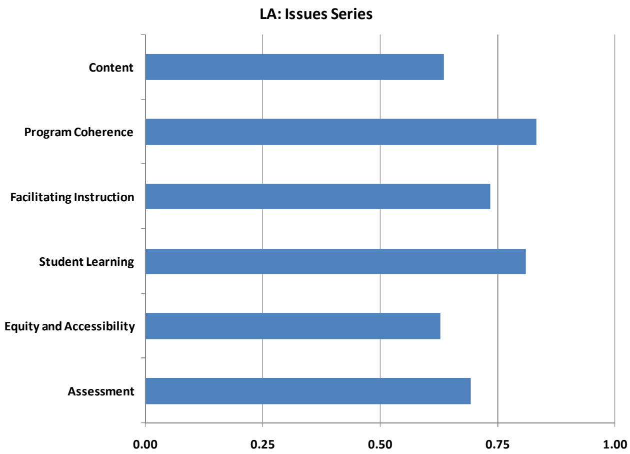


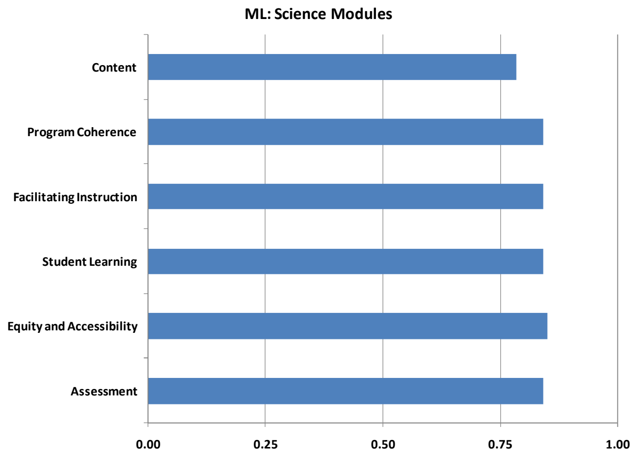


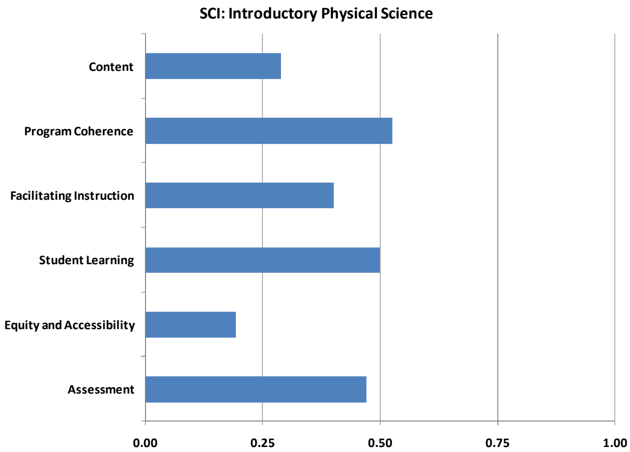


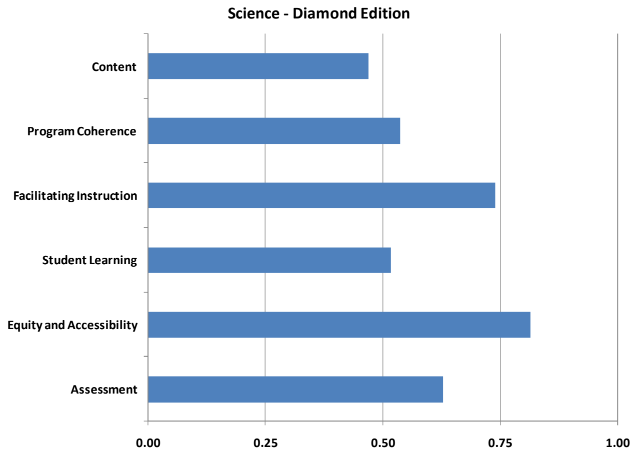


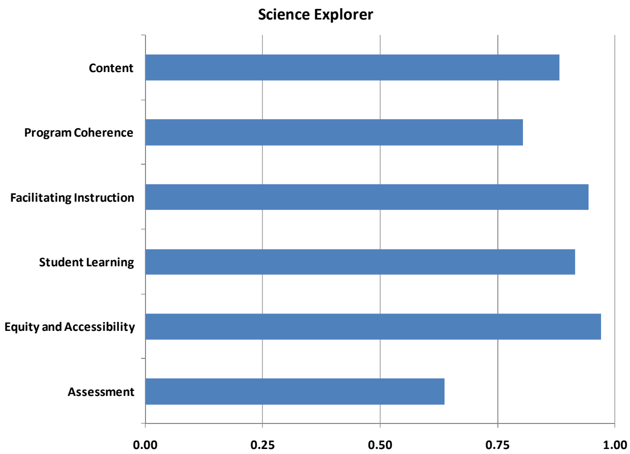


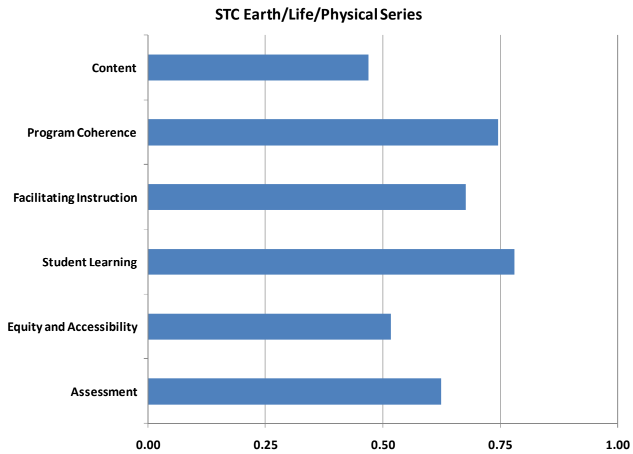

LA: Issues Series
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00


ML: Science Modules
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00


SCI: Introductory Physical Science
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00


Science - Diamond Edition
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00


Science Explorer
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00


STC Earth/Life/Physical Series
Content
Program Coherence
Facilitating Instruction
Student Learning
Equity and Accessibility
Assessment
0.00
0.25
0.50
0.75
1.00

3.3 High School

It is important to note that the Revised Washington State Science Standards for Domains in the high school cover basic science intended for grades 9-11. The Cross-cutting Standards of Systems, Inquiry and Application are the framework for the 9-11 Domain standards and are an integral part of alignment review for all materials. The standards do not address all college preparatory or advanced placement requirements. Thus, in some instances, some texts designed for the 9-10 grade levels compared very favorably with the more rigorous college preparatory courses for grades 11-12. This report should not be used to evaluate college prep or advanced placement materials, and was never intended to cover advanced high school science. Some of the materials in the HS section fall into a gray zone between basic and advanced science. They may not score as well when compared with courses truly designed for basic 9-11 science courses, but when evaluated as advanced material they may be very strong.

3.3.1 Content (Standards Alignment and Program Coherence)

Course	Program Name	High School Content Measure SY	IN	AP	PS	ES	LS	All
Biology	Agile Mind Biology	◔	◔	◔			●	◕
	Biology: A Human Approach	●	●	●			●	●
	Glencoe Biology	◔	◕	◕			◕	◕
	Holt Biology	◔	◑	◑			◕	◑
	Insights in Biology	◑	◕	◕			●	◕
	McGraw-Hill Life Science	◔	◔	◔			◕	◑
	Pearson Biology	◔	◔	◑			●	◕
	What is Life? A Guide to Biology	◔	◔	◔			◕	◑
Biology Total		◑	◑	◑			◕	◕
Chemistry	Active Chemistry	◕	◕	●	●			◕
	Chemistry in the Community	◔	◔	◑	●			◑
	Chemistry: C&A	◔	◔	◑	◕			◑
	Chemistry: Matter and Change	◑	◔	◔	●			◑
	Holt Modern Chemistry	◔	◔	◑	●			◑
	Investigating Chemistry	◔	○	◔	◕			◔
	Kendall/Hunt Chemistry	◔	◕	◕	◕			◕
	Pearson Chemistry	○	◔	◔	◕			◑
	World of Chemistry	◔	◔	◔	●			◑
Chemistry Total		◔	◔	◑	●			◑
Earth Science	Discovering the Universe	○	○	○		◔		○
	EarthComm	◕	◕	●		◕		◕
	Essential Earth	○	○	○		◔		○
	Glencoe Earth Science: GEU	◔	◔	◑		◕		◑
	Holt Earth Science	◔	◔	◑		◕		◑
	McGraw-Hill Earth & Space Science	◔	○	◔		●		◑
	Pearson Earth Science	○	◔	○		◑		◔
	Science of Earth Systems	◔	○	◔		◑		◔
Earth Science Total		◔	◔	◔		◑		◔
Physical Science	Active Physical Science	◔	◑	◑	◕			◕
	Conceptual Physical Science	○	○	○	◑			◑
	Foundations of Physical Science	◕	◕	◕	◕			◕
	Glencoe Physical Sci w/ Earth Sci	○	◔	◑	◕			◑
	Glencoe Physical Science	○	◑	◑	◕			◑
	Holt Physical Science	◔	◑	◔	◕			◕
	Holt Physical, Earth & Space	◔	◔	◔	◕			◑
	McGraw-Hill Physical Science	◔	◔	◔	◑			◑
	Pearson Physical Science	○	◔	◔	◕			◑
Physical Science Total		◔	◔	◑	◕			◑
Physics	Active Physics	◔	◕	●	●			●
	Conceptual Physics	◔	○	◔	●			◑
	Foundations of Physics	◕	◑	◑	◕			◑
	Glencoe Physics	◔	◔	◑	●			◑
	Holt Physics	◔	◑	◑	●			◕
	Physics: A First Course	◑	◑	◑	◕			◕
Physics Total		◑	◑	◑	●			◕
Integrated	Conceptual Integrated Science	◔	◔	◔	◕	◑	◑	◑
	Coordinated Science	◕	◕	●	●	◕	○	◑
	Science and Sustainability	◑	◕	●	◔	○	◔	◑
	Science: An Inquiry Approach	◕	●	●	◕	◕	◕	◕
Integrated Total		◑	◕	◕	◑	◑	◑	◑
Grand Total		◔	◑	◑	◕	◑	◕	◑

Figure 22. High School Standards Alignment Measures.

Course	Program Name	High School Program Coherence						
		P1	P2	P3	P4	P5	P6	All
Biology	Agile Mind Biology	●	◕	◕	◕	◑	◕	◕
	Biology: A Human Approach	●	●	●	●	●	◕	●
	Glencoe Biology	◕	◕	◑	◕	◑	○	◑
	Holt Biology	◑	◑	◕	◑	◔	◑	◑
	Insights in Biology	●	●	●	●	◑	●	●
	McGraw-Hill Life Science	◑	◔	◕	◑	◑	◕	◑
	Pearson Biology	◕	●	◑	●	◑	◑	◕
	What is Life? A Guide to Biology	●	◕	◕	◑	◑	◕	◑
Biology Total		◕	◕	◕	◕	◑	◕	◕
Chemistry	Active Chemistry	●	●	●	●	◕	●	●
	Chemistry in the Community	◕	◔	●	◕	◔	◕	◕
	Chemistry: C&A	◕	◕	◕	◕	◕	◕	◕
	Chemistry: Matter and Change	◕	◑	◑	◑	◔	◑	◑
	Holt Modern Chemistry	◕	◑	◑	○	◔	◕	◑
	Investigating Chemistry	◑	◔	◑	◔	◔	◔	◑
	Kendall/Hunt Chemistry	●	◕	●	●	◔	●	◕
	Pearson Chemistry	◑	◑	◑	◑	◑	◔	◑
	World of Chemistry	◕	◔	◑	◔	◔	◑	◑
Chemistry Total		◕	◑	◕	◑	◑	◕	◑
Earth Science	Discovering the Universe	◕	◑	◑	◑	◔	◔	◑
	EarthComm	◕	●	●	●	◕	◑	◕
	Essential Earth	◔	◔	○	○	○	◑	◔
	Glencoe Earth Science: GEU	◕	◑	◑	◑	◕	◑	◑
	Holt Earth Science	◕	◑	◑	◑	◑	●	◕
	McGraw-Hill Earth & Space Science	◑	◑	◔	◔	◑	◕	◑
	Pearson Earth Science	◔	◔	◔	◑	◑	○	◔
	Science of Earth Systems	◑	◔	○	○	○	◑	◔
Earth Science Total		◑	◑	◔	◑	◔	◑	◑
Physical Science	Active Physical Science	●	◕	●	●	◑	◑	◕
	Conceptual Physical Science	◑	◑	◑	◔	◑	◔	◑
	Foundations of Physical Science	◕	◕	◕	◕	◑	●	◕
	Glencoe Physical Sci w/ Earth Sci	◑	◔	◔	◑	◑	◑	◑
	Glencoe Physical Science	◑	◑	◔	◔	◕	◕	◑
	Holt Physical Science	◕	◕	◔	◑	◑	◕	◑
	Holt Physical, Earth & Space	◕	◑	◑	◔	◔	◔	◑
	McGraw-Hill Physical Science	◑	◑	◑	◑	◔	●	◑
	Pearson Physical Science	◔	◔	◔	◑	◔	◔	◔
Physical Science Total		◑	◑	◑	◑	◑	◑	◑
Physics	Active Physics	●	●	●	●	◕	◕	●
	Conceptual Physics	◕	◑	◑	◑	◔	●	◑
	Foundations of Physics	◕	◕	◕	◕	◑	◕	◕
	Glencoe Physics	◕	◑	◑	◑	◔	◔	◑
	Holt Physics	◑	◔	◔	◑	◑	◑	◑
	Physics: A First Course	◕	◑	◑	◑	◑	○	◑
Physics Total		◕	◑	◑	◕	◑	◑	◑
Integrated	Conceptual Integrated Science	◑	◑	◔	◑	◑	○	◑
	Coordinated Science	●	●	●	●	◕	◕	●
	Science and Sustainability	●	◑	◕	●	◕	●	◕
	Science: An Inquiry Approach	●	●	●	●	◕	◕	●
Integrated Total		●	◕	◕	●	◕	◕	◕
Grand Total		◕	◑	◑	◑	◑	◑	◑

Figure 23. High School Program Coherence.

3.3.1.1 Biology

High School Biology Detailed Content Results									
Item	Agile Mind Biology	Biology: A Human Approach	Glencoe Biology	Holt Biology	Insights in Biology	McGraw-Hill Life Science	Pearson Biology	What is Life? A Guide to Biology	Grand Total
9-12 SYSA	◕	●	◔	◔	◑	◔	◑	○	◑
9-12 SYSB	◔	●	◔	◔	◑	◔	○	◔	◑
9-12 SYSC	◔	●	◔	◑	◑	○	◑	◔	◑
9-12 INQA	◔	●	◑	◔	◕	○	○	◔	◑
9-12 INQB	◔	●	●	◑	●	◔	◑	◔	◕
9-12 INQC	◕	●	●	◑	●	◔	◑	◑	◕
9-12 INQD	◔	●	◕	◑	●	◔	◔	◔	◑
9-12 INQE	◔	●	●	◑	●	○	○	◑	◑
9-12 INQF	◑	●	◕	◔	●	○	◔	◑	◑
9-12 INQG	◔	●	◑	◔	●	○	◔	◔	◑
9-12 INQH	◔	◑	○	○	◑	○	○	◔	◔
9-12 APPA	◑	●	◕	◕	◕	◑	●	◑	◕
9-12 APPB	○	●	◑	◔	◕	◔	◑	◔	◑
9-12 APPC	○	●	◑	○	◕	○	◔	◔	◑
9-12 APPD	◔	●	◑	◔	◔	◔	◑	○	◑
9-12 APPE	◑	●	◕	◑	●	◔	◕	◕	◕
9-12 APPF	◔	●	◕	◕	●	◔	●	◕	◕
9-12 LS1A	●	◕	◕	◕	●	◕	◕	◑	◕
9-12 LS1B	◕	◕	◑	◑	◕	◑	◕	◑	◑
9-12 LS1C	●	◕	●	●	●	●	●	◕	●
9-12 LS1D	●	●	●	●	●	◕	●	●	●
9-12 LS1E	●	●	●	●	●	●	●	●	●
9-12 LS1F	◕	●	◔	◕	●	◑	◕	◑	◕
9-12 LS1G	◕	●	◑	◑	●	◔	●	◑	◑
9-12 LS1H	◕	●	●	◕	●	◕	●	●	●
9-12 LS1I	●	●	●	◕	●	◕	●	●	●
9-12 LS2A	●	●	●	◕	●	◕	●	◕	●
9-12 LS2B	◕	●	◕	◕	●	◕	●	◕	◕
9-12 LS2C	●	●	●	●	●	◕	◕	◕	●
9-12 LS2D	◑	◑	◑	◔	◑	◑	◑	◔	◑
9-12 LS2E	◕	◕	◕	◑	●	◕	◕	◕	◕
9-12 LS2F	◕	◕	◑	◔	◑	◔	●	◑	◑
9-12 LS3A	●	●	◕	◕	●	●	●	◕	●
9-12 LS3B	●	●	●	◑	●	◕	●	◕	●
9-12 LS3C	◕	●	◕	◑	●	◕	●	◕	◕
9-12 LS3D	●	●	●	◕	◕	●	●	◕	●
9-12 LS3E	●	●	●	◕	●	●	●	◕	●
Total	◕	●	◕	◑	◕	◑	◕	◑	◕

Figure 24. Average Score by Standard for High School Biology Programs.

3.3.1.2 Chemistry

High School Chemistry Detailed Content Results

Item	Active Chemistry	Chemistry in the Community	Chemistry: C&A	Chemistry: Matter and Change	Holt Modern Chemistry	Investigating Chemistry	Kendall/Hunt Chemistry	Pearson Chemistry	World of Chemistry	Grand Total
9-12 SYSA	◑	○	◔	◔	○	◔	○	○	◔	○
9-12 SYSB	◕	◔	◔	◔	◔	◔	◔	○	○	◔
9-12 SYSC	◕	◑	◔	◕	◑	◑	◑	○	◑	◑
9-12 INQA	◕	○	○	○	○	◔	◕	○	◔	◔
9-12 INQB	●	◑	◔	◔	◔	○	●	◔	◑	◑
9-12 INQC	●	◕	◕	◕	◑	◔	●	◑	◕	◕
9-12 INQD	◕	◔	◔	◔	◔	○	●	◔	◔	◔
9-12 INQE	●	○	◑	◑	◔	○	◕	◔	◑	◑
9-12 INQF	◕	◔	○	◑	◔	◔	◕	◔	◔	◔
9-12 INQG	●	○	○	○	◔	○	●	◔	◔	◔
9-12 INQH	○	○	◔	○	◔	○	◕	○	○	○
9-12 APPA	●	◕	◕	◔	◕	○	◑	◑	◑	◑
9-12 APPB	●	◕	○	○	◔	○	◕	○	◔	◔
9-12 APPC	●	◔	○	○	◔	○	◕	○	○	◔
9-12 APPD	●	◕	●	◕	◑	◑	◕	◑	◕	◕
9-12 APPE	◕	◕	◕	◔	◑	◑	◕	◔	◔	◑
9-12 APPF	◕	◕	◕	◕	◑	◑	◑	○	◔	◑
9-12 PS2A	●	●	●	●	●	◕	●	◕	●	●
9-12 PS2B	●	◕	◕	●	●	◔	◕	◑	◕	◕
9-12 PS2C	●	●	●	●	●	◑	●	●	●	●
9-12 PS2D	●	◕	●	●	●	◕	◕	◕	●	●
9-12 PS2E	●	●	◕	●	●	◕	●	◕	●	●
9-12 PS2F	●	●	◕	●	●	◕	◑	◑	●	◕
9-12 PS2G	●	●	●	●	●	◕	●	●	●	●
9-12 PS2H	●	●	●	●	●	◕	●	●	●	●
9-12 PS2I	●	◕	◑	●	●	◕	◑	◕	◕	◕
9-12 PS2J	◑	●	◑	●	●	◕	◕	●	◕	◕
9-12 PS2K	◑	●	◕	●	●	◕	◔	◑	◕	◕
Total	◕	◑	◑	◑	◑	◔	◕	◑	◑	◑

Figure 25. Average Score by Standard for High School Chemistry Programs.

3.3.1.3 Earth Science

High School Earth Science Detailed Content Results									
Item	Discovering the Universe	EarthComm	Essential Earth	Glencoe Earth Science: GEU	Holt Earth Science	McGraw-Hill Earth & Space Science	Pearson Earth Science	Science of Earth Systems	Grand Total
9-12 SYSA	○	◑	◑	○	◔	◔	○	○	◔
9-12 SYSB	◔	◕	○	○	◔	◑	◔	◔	◔
9-12 SYSC	○	●	○	◑	◔	◔	○	◔	◔
9-12 INQA	○	●	○	○	◔	○	○	○	○
9-12 INQB	◔	●	○	◑	◑	○	◑	○	◔
9-12 INQC	◔	●	○	◑	◑	○	◑	○	◔
9-12 INQD	○	●	○	◑	◔	○	◔	○	◔
9-12 INQE	○	◕	○	◑	◔	○	◔	○	◔
9-12 INQF	◔	●	○	◔	◔	◔	◔	○	◔
9-12 INQG	○	◕	○	◔	◔	○	◔	○	○
9-12 INQH	○	◔	○	◔	◔	○	○	○	○
9-12 APPA	○	●	○	◑	◑	◑	◔	◔	◑
9-12 APPB	○	●	○	◑	◔	◔	○	○	◔
9-12 APPC	○	●	○	◔	◔	○	○	○	◔
9-12 APPD	○	●	○	◕	◑	◔	○	◕	◑
9-12 APPE	○	◕	○	◑	◔	◑	◔	○	◔
9-12 APPF	○	●	○	◑	◑	◑	◔	○	◔
9-12 ES1A	◕	◑	○	◕	◕	●	◑	◑	◑
9-12 ES1B	●	◑	○	◑	●	◕	◔	◕	◑
9-12 ES2A	◔	●	○	◕	◕	●	◔	◑	◑
9-12 ES2B	○	●	○	◕	◑	●	◑	◑	◑
9-12 ES2C	○	◕	◔	◕	◕	◑	◑	◕	◑
9-12 ES2D	○	●	◑	◕	◑	●	◑	◑	◑
9-12 ES3A	○	●	◔	●	●	●	◑	◑	◕
9-12 ES3B	○	◕	◕	●	●	●	◕	◑	◕
9-12 ES3C	○	◑	◑	◕	◑	●	○	◑	◑
9-12 ES3D	○	●	◕	◑	◔	●	◑	◑	◑
Total	○	◕	○	◑	◑	◑	◔	◔	◔

Figure 26. Average Score by Standard for High School Earth Science Programs.

3.3.1.4 Physical Science

High School Physical Science Detailed Content Results

Item	Active Physical Science	Conceptual Physical Science	Foundations of Physical Science	Glencoe Physical Sci w/ Earth Sci	Glencoe Physical Science	Holt Physical Science	Holt Physical, Earth & Space	McGraw-Hill Physical Science	Pearson Physical Science	Grand Total
9-12 SYSA	○	○	◑	○	○	○	○	○	○	○
9-12 SYSB	◔	○	◕	○	○	○	○	◔	○	◔
9-12 SYSC	◑	○	◕	○	○	◔	◔	◔	○	◔
9-12 INQA	○	○	◕	◔	◔	○	◔	◔	○	◔
9-12 INQB	◑	◔	◑	●	◕	◕	◑	◑	◑	◑
9-12 INQC	●	○	◕	◕	◑	◑	◑	◑	◑	◑
9-12 INQD	◕	○	◑	◔	◕	◕	◔	◔	◑	◑
9-12 INQE	◕	○	●	◑	◔	◔	◑	◑	◑	◑
9-12 INQF	◔	○	◕	○	◔	◑	○	◔	◔	◔
9-12 INQG	◑	○	◑	◔	◑	◔	○	○	○	◔
9-12 INQH	○	○	◕	○	○	○	○	○	○	○
9-12 APPA	◑	○	◑	◕	◑	◕	◕	◑	◑	◑
9-12 APPB	◕	○	◑	◑	◔	○	◔	◔	○	◔
9-12 APPC	◕	○	◕	◑	◔	◔	◔	◔	○	◔
9-12 APPD	●	◑	●	◑	◕	◕	◑	◑	◔	◕
9-12 APPE	◑	○	◑	◑	◔	◔	◔	◑	◔	◔
9-12 APPF	○	◔	◑	◑	◔	◔	○	◔	◑	◔
9-12 PS1A	◕	◕	◕	◕	◑	◕	◕	◑	◑	◕
9-12 PS1B	●	◑	◕	◕	◕	●	◕	◑	◕	◕
9-12 PS1C	●	◕	◕	◕	◕	◕	◑	◑	◕	◕
9-12 PS1D	●	◕	◕	◑	◕	◕	◕	◑	◕	◕
9-12 PS1E	●	◕	●	◑	◕	●	◕	◑	◕	◕
9-12 PS1F	◔	◕	◕	◑	◑	●	◑	◑	◑	◑
9-12 PS1G	●	◑	●	◕	◕	●	◕	◑	◕	◕
9-12 PS1H	●	◕	●	◑	◕	●	●	◑	◕	◕
9-12 PS2A	●	◕	●	◕	◕	●	●	◑	●	◕
9-12 PS2B	◕	◑	●	◑	◑	◕	◕	◑	◕	◕
9-12 PS2C	●	◑	●	◕	◕	●	●	◑	●	◕
9-12 PS2D	◕	◕	●	◑	◑	◕	◕	◑	●	◕
9-12 PS2E	●	◕	●	◑	◕	◕	◑	◑	●	◕
9-12 PS2F	◑	◑	●	○	◕	●	◑	◕	◑	◕
9-12 PS2G	●	◑	●	◕	◕	◕	◑	◕	◕	◕
9-12 PS2H	◑	◕	◕	◑	◕	●	●	◕	◑	◕
9-12 PS2I	◕	○	◕	◕	◑	●	◕	◕	◕	◕
9-12 PS2J	●	◑	◕	◑	◑	●	●	◑	◑	◕
9-12 PS2K	◕	◕	●	◕	◕	◕	◕	◕	●	◕
9-12 PS3A	●	◑	●	◕	◕	◑	◑	◕	◕	◕
9-12 PS3B	●	◑	◕	◕	◕	●	◑	◑	◕	◕
9-12 PS3C	●	◑	●	◕	◕	◕	◔	◑	◕	◕
9-12 PS3D	◕	◕	●	◑	◕	◕	●	◕	◑	◕
9-12 PS3E	◑	◑	◕	◕	◕	◕	◕	◑	●	◕
Total	◕	◑	◕	◑	◑	◕	◑	◑	◑	◑

Figure 27. Average Score by Standard for High School Physical Science Programs.

3.3.1.5 Physics

High School Physics Detailed Content Results							
Item	Active Physics	Conceptual Physics	Foundations of Physics	Glencoe Physics	Holt Physics	Physics: A First Course	Grand Total
9-12 SYSA	◑	◔	◑	○	◔	◔	◔
9-12 SYSB	◑	◔	◕	◔	◑	◕	◑
9-12 SYSC	◔	◑	◕	◔	◔	◕	◑
9-12 INQA	◑	○	◔	○	○	◔	◔
9-12 INQB	●	○	◑	◑	◕	◑	◑
9-12 INQC	●	◔	◕	◑	◕	◑	◕
9-12 INQD	◕	○	◑	○	◑	◕	◑
9-12 INQE	◕	◔	◑	◑	◑	◑	◑
9-12 INQF	◕	○	◕	◑	◔	◑	◑
9-12 INQG	●	○	◕	◔	◔	◑	◑
9-12 INQH	◑	○	◑	○	○	○	○
9-12 APPA	●	◕	◕	◑	◔	◑	◑
9-12 APPB	●	○	◔	◑	◕	◔	◑
9-12 APPC	●	○	◔	○	◑	◔	◔
9-12 APPD	●	◕	◕	●	●	●	●
9-12 APPE	●	○	◔	○	◑	◑	◑
9-12 APPF	●	◑	◔	◑	◑	◔	◑
9-12 PS1A	●	◕	◔	●	●	◑	◕
9-12 PS1B	●	◕	◑	●	●	◕	◕
9-12 PS1C	●	●	◕	●	●	●	●
9-12 PS1D	●	●	◕	●	●	●	●
9-12 PS1E	●	●	◕	●	●	●	●
9-12 PS1F	●	●	◕	●	●	◑	●
9-12 PS1G	●	●	◕	●	●	●	●
9-12 PS1H	●	●	●	●	●	●	●
9-12 PS3A	●	●	◕	◕	●	●	●
9-12 PS3B	●	●	◕	●	●	●	●
9-12 PS3C	●	●	◑	●	●	◕	●
9-12 PS3D	●	●	◕	◕	●	●	●
9-12 PS3E	●	◕	◕	◕	●	●	◕
Total	●	◑	◑	◑	◕	◕	◕

Figure 28. Average Score by Standard for High School Physics Programs.

3.3.1.6 Integrated

HS Integrated Detailed Content Results					
Item	Conceptual Integrated Science	Coordinated Science	Science and Sustainability	Science: An Inquiry Approach	Grand Total
9-12 SYSA	◑	◕	◔	◔	◔
9-12 SYSB	◑	◕	◔	●	◑
9-12 SYSC	◔	◑	◕	◕	◑
9-12 INQA	◑	◔	◑	●	◑
9-12 INQB	○	●	●	●	◕
9-12 INQC	○	◕	●	●	◕
9-12 INQD	◔	◑	●	●	◕
9-12 INQE	◔	◑	◕	◕	◕
9-12 INQF	◔	◕	◕	◕	◕
9-12 INQG	○	◕	◕	●	◕
9-12 INQH	○	◔	○	●	◔
9-12 APPA	◕	●	●	●	●
9-12 APPB	○	●	◕	●	◕
9-12 APPC	○	●	◕	◕	◕
9-12 APPD	○	●	●	●	◕
9-12 APPE	○	◕	●	●	◕
9-12 APPF	○	●	●	●	◕
9-12 PS1A	◕	◕	◑	◕	◕
9-12 PS1B	◑	◕	◑	●	◕
9-12 PS1C	●	●	◕	●	●
9-12 PS1D	◕	●	◕	◕	◕
9-12 PS1E	●	●	○	●	◕
9-12 PS1F	●	◕	○	●	◑
9-12 PS1G	◑	●	○	◕	◑
9-12 PS1H	◕	●	○	○	◔
9-12 PS2A	●	●	◑	◕	◕
9-12 PS2B	◕	●	◔	◕	◕
9-12 PS2C	◑	●	◑	◕	◕
9-12 PS2D	◕	●	○	◕	◑
9-12 PS2E	◕	●	◑	◑	◕
9-12 PS2F	◔	◕	◕	◕	◕
9-12 PS2G	◔	●	◑	◕	◕
9-12 PS2H	◕	◑	◔	◕	◑
9-12 PS2I	◑	◕	◔	◑	◑
9-12 PS2J	◕	◑	◑	◕	◑
9-12 PS2K	◕	◑	◑	◕	◕
9-12 PS3A	○	●	◕	◑	◑
9-12 PS3B	◑	◕	○	◔	◔
9-12 PS3C	◑	●	◔	◑	◑
9-12 PS3D	●	●	◔	◕	◕
9-12 PS3E	◑	◕	◔	◕	◑

continued					
Item	Conceptual Integrated Science	Coordinated Science	Science and Sustainability	Science: An Inquiry Approach	Grand Total
9-12 ES1A	◑	◕	○	◕	◑
9-12 ES1B	◔	◔	○	◕	◔
9-12 ES2A	◕	●	○	●	◑
9-12 ES2B	◑	●	○	◑	◑
9-12 ES2C	◑	●	○	◕	◑
9-12 ES2D	◑	◕	●	●	◕
9-12 ES3A	◕	●	○	◕	◑
9-12 ES3B	◑	◑	○	●	◑
9-12 ES3C	◑	○	○	◔	○
9-12 ES3D	◕	●	○	◑	◑
9-12 LS1A	◑	○	◕	◕	◑
9-12 LS1B	◑	○	◔	◕	◔
9-12 LS1C	◕	○	◔	◕	◑
9-12 LS1D	●	○	●	◕	◕
9-12 LS1E	●	○	◕	●	◕
9-12 LS1F	◔	○	◔	◕	◔
9-12 LS1G	◔	○	○	◑	○
9-12 LS1H	◕	○	◑	◕	◑
9-12 LS1I	◕	○	◔	●	◑
9-12 LS2A	◑	○	◔	◑	◔
9-12 LS2B	◔	○	●	●	◑
9-12 LS2C	◔	○	●	●	◑
9-12 LS2D	○	○	◑	◕	◔
9-12 LS2E	◔	○	◑	◕	◔
9-12 LS2F	○	○	●	◕	◑
9-12 LS3A	●	○	○	●	◑
9-12 LS3B	◑	○	○	●	◔
9-12 LS3C	◑	○	○	◕	◔
9-12 LS3D	◑	○	○	●	◔
9-12 LS3E	◑	○	○	◕	◔
Total	◑	◑	◑	◕	◑

Figure 29. Average Score by Standard for High School Integrated Programs.

3.3.2 Key Program Elements

3.3.2.1 Biology

All High School Biology Results for Key Program Elements										
Scale	**Item**	**Agile Mind Biology**	**Biology: A Human Approach**	**Glencoe Biology**	**Holt Biology**	**Insights in Biology**	**McGraw-Hill Life Science**	**Pearson Biology**	**What is Life? A Guide to Biology**	**Grand Total**
Student Learning	S1	◕	●	◕	◔	●	◔	◕	◑	◕
	S2	◕	●	◕	◕	●	◑	●	◔	◕
	S3	◑	●	●	◕	◕	◕	●	◑	◕
	S4	◑	●	◑	◔	●	◑	◑	○	◕
	S5	◔	●	◕	◑	●	◔	●	○	◕
	S6	◕	●	◕	◑	●	◔	◑	◔	◕
Student Learning Total		◑	●	◕	◑	●	◑	◕	◔	◕
Facilitating Instruction	F1	●	●	◕	◑	◕	◑	◕	○	◕
	F2	◕	●	◑	◔	●	◔	◑	◔	◑
	F3	◑	●	●	◕	◑	◕	●	○	◕
	F4	◑	●	◕	◑	●	◔	◑	○	◑
	F5	◑	●	◕	●	◕	◕	◕	○	◕
	F6	◕	●	◕	◕	●	◕	◑	○	◕
Facilitating Instruction Total		◕	●	◕	◕	◕	◑	◕	○	◕
Equity and Accessibility	E1	◑	◕	●	◕	◔	◑	●	◔	◑
	E2	◔	●	◕	◕	◕	◕	●	○	◕
	E3	◔	◕	◑	◕	○	◔	◑	○	◑
	E4	◕	●	●	●	◕	●	●	◕	●
	E5	◑	●	●	●	◕	◕	◕	◕	◕
	E6	◑	●	●	●	◕	●	●	◕	●
Equity and Accessibility Total		◑	●	◕	◕	◑	◕	●	◑	◕
Assessment	A1	◕	●	◕	◔	●	◔	◕	◑	◕
	A2	◑	●	◑	◑	◕	◔	◕	○	◑
	A3	◕	●	◑	◑	◕	◑	◑	◔	◕
	A4	◕	●	◕	◑	●	◔	◕	◑	◕
	A5	◑	●	◑	◔	●	◔	◕	◑	◑
	A6	◕	●	◕	◑	◕	◕	●	◔	◕
Assessment Total		◕	●	◑	◑	●	◑	◕	◔	◕

Figure 30. High School Biology Key Program Elements.

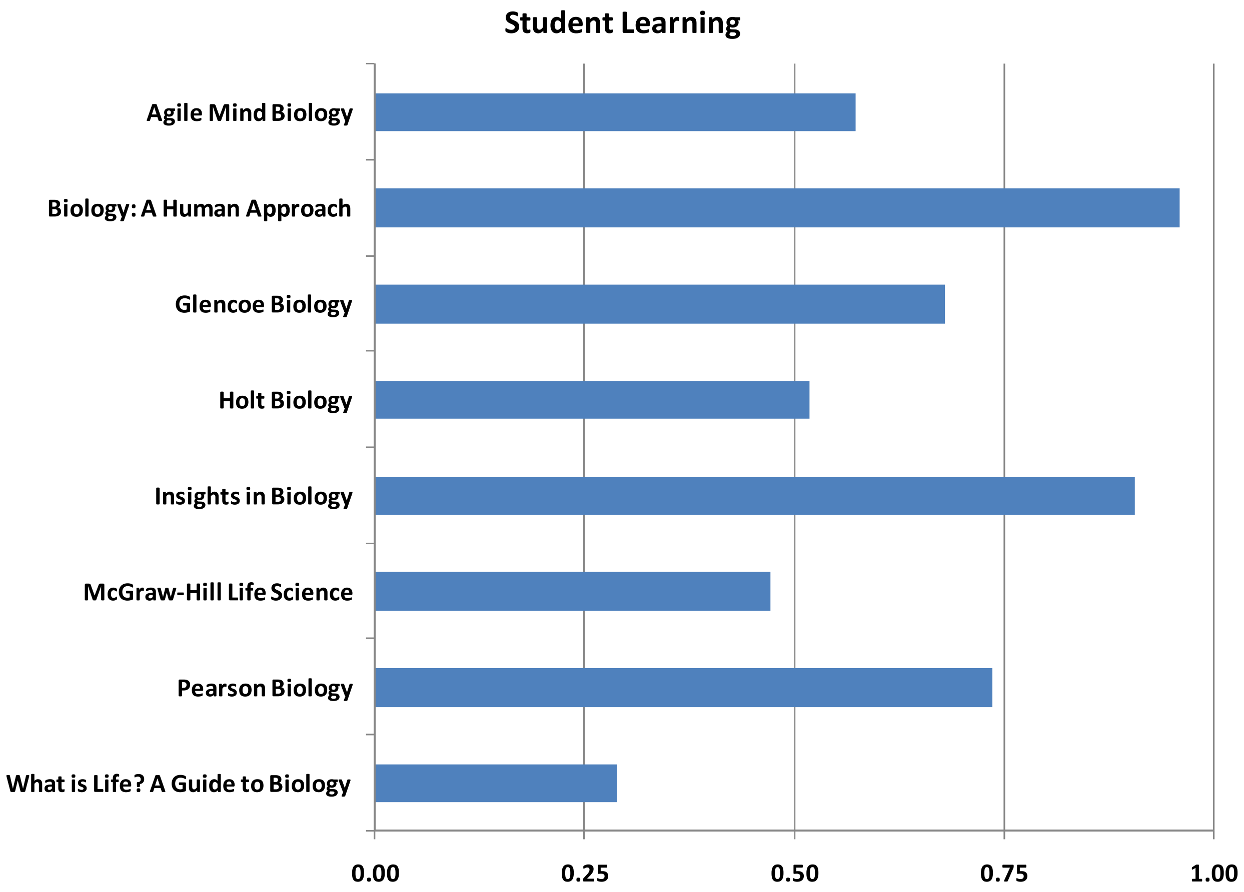


Figure 31. High School Biology Student Learning.

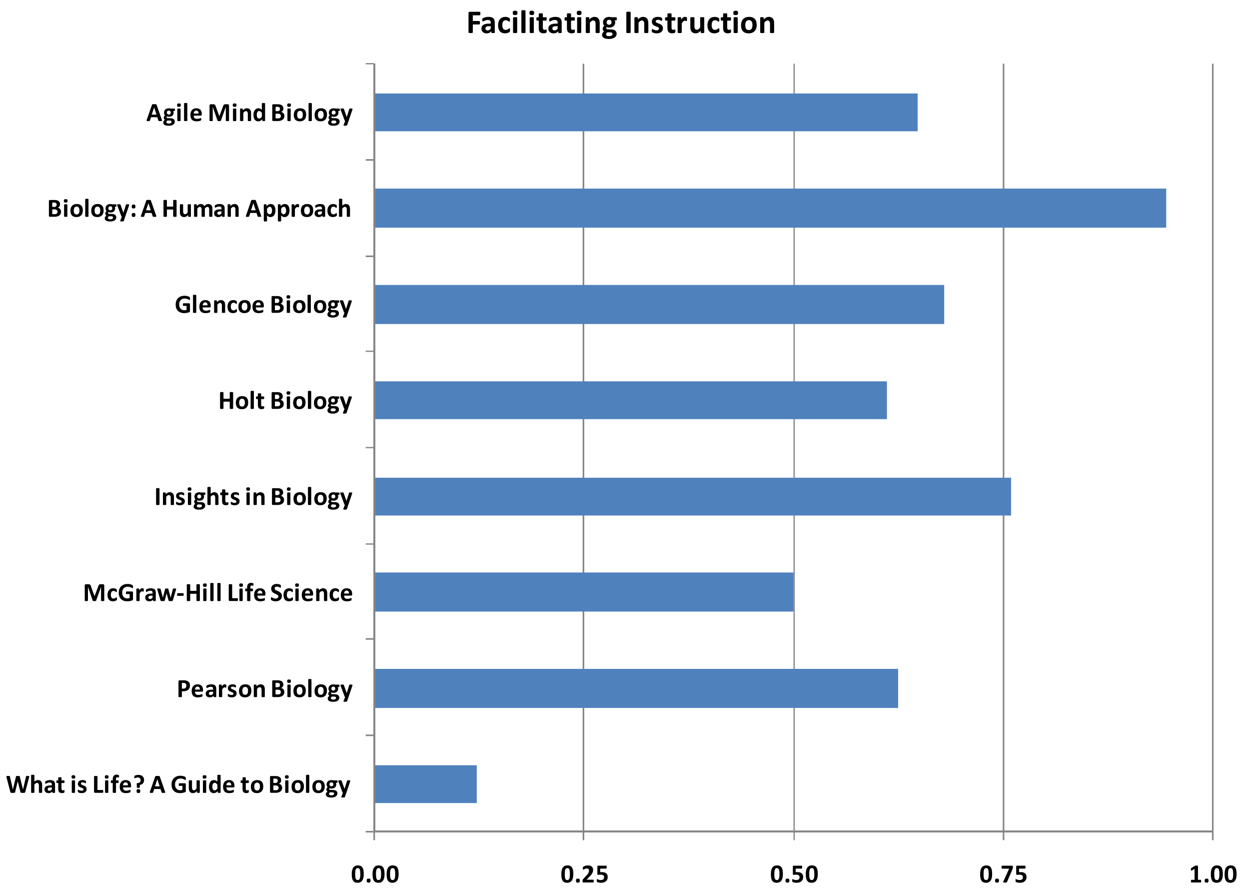


Figure 32. High School Biology Facilitating Instruction.

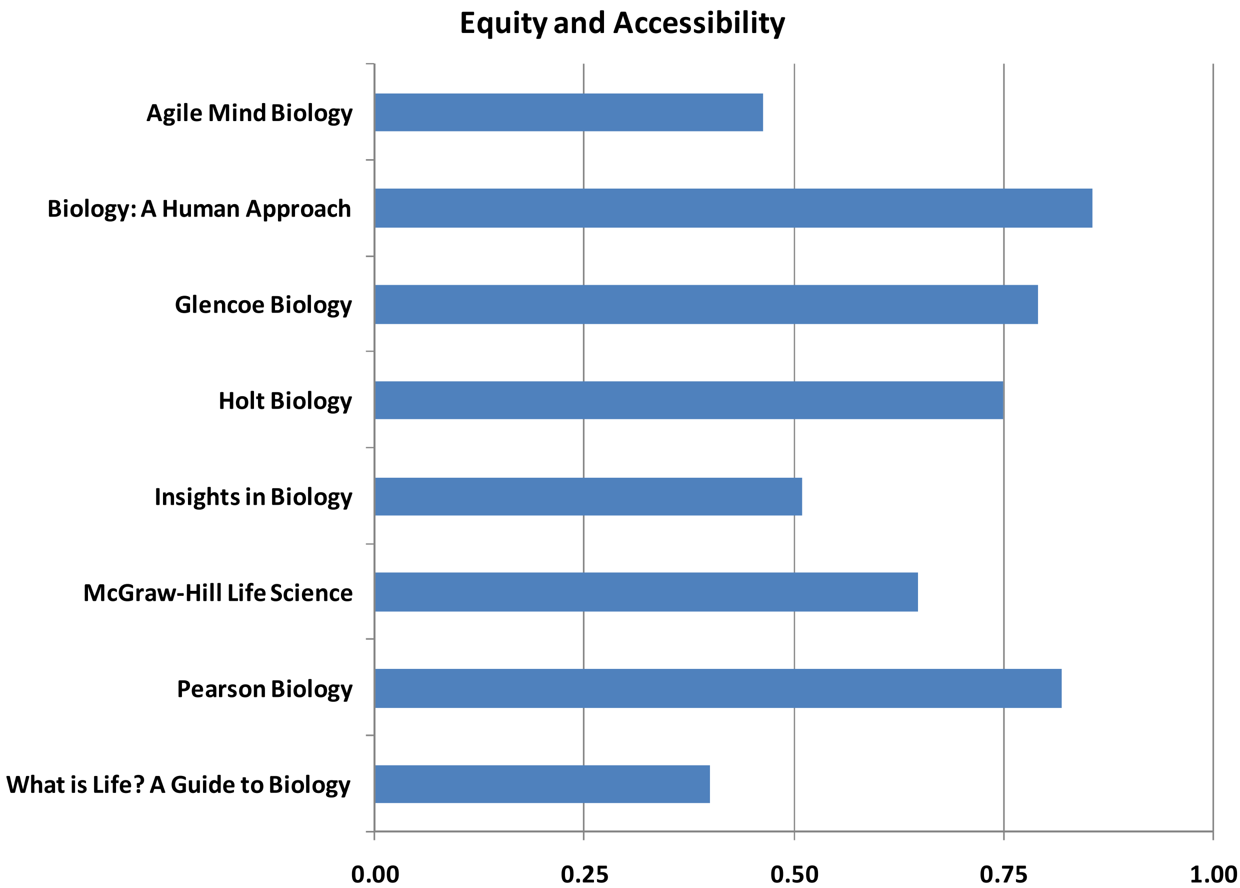


Figure 33. High School Biology Equity and Accessibility.

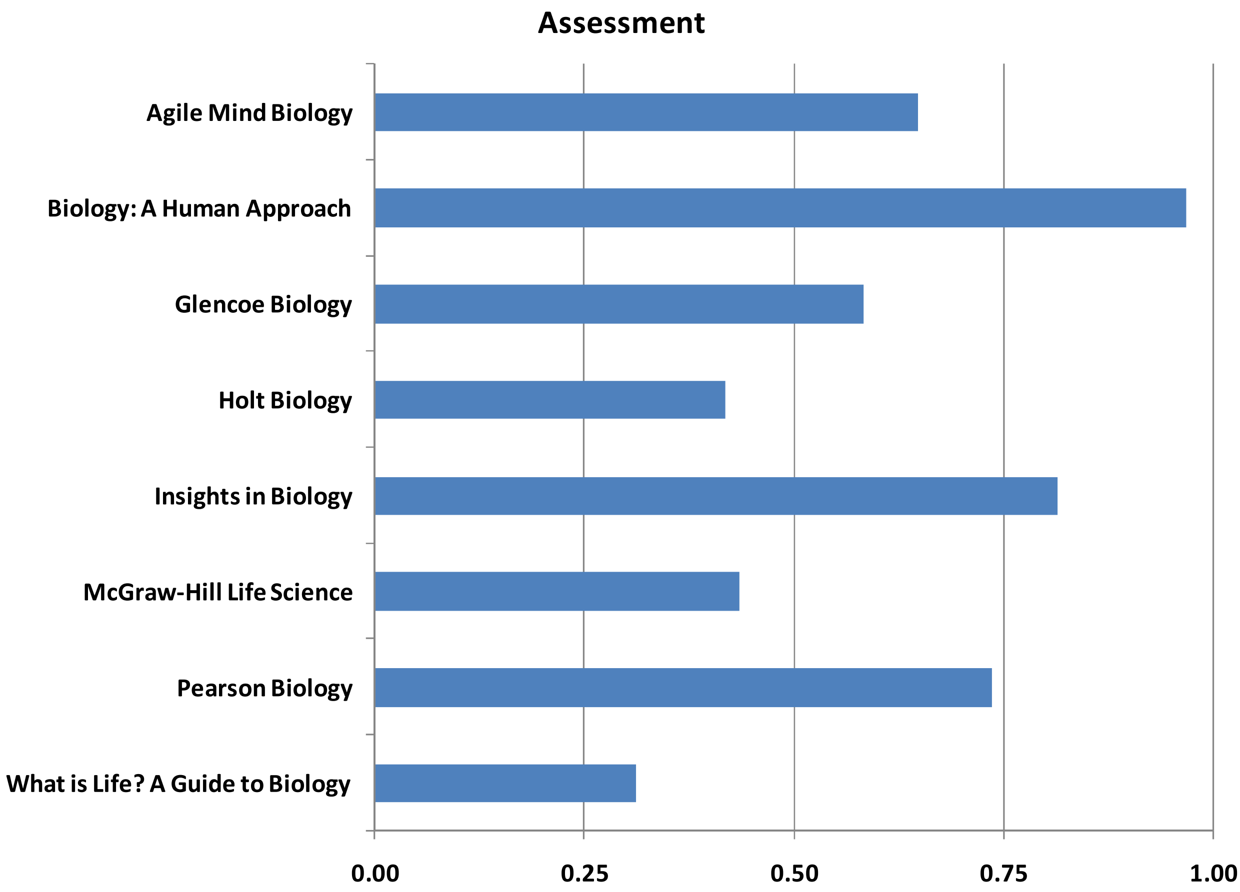


Figure 34. High School Biology Assessment.

3.3.2.2 Chemistry

All High School Chemistry Results for Key Program Elements											
Scale	**Item**	**Active Chemistry**	**Chemistry in the Community**	**Chemistry: C&A**	**Chemistry: Matter and Change**	**Holt Modern Chemistry**	**Investigating Chemistry**	**Kendall/Hunt Chemistry**	**Pearson Chemistry**	**World of Chemistry**	**Grand Total**
Student Learning	S1	●	◕	◑	◔	◑	◑	●	◔	◔	◑
	S2	●	◕	◕	◑	◔	◔	●	◑	◑	◕
	S3	●	◑	●	●	●	◕	◕	◕	◕	◕
	S4	●	◔	◔	◔	◔	◔	◕	◔	◔	◑
	S5	●	◑	◕	◕	◔	◔	◕	◑	◔	◑
	S6	●	◑	◑	◕	◑	◑	●	◑	◕	◕
Student Learning Total		●	◑	◑	◑	◑	◔	◕	◑	◑	◑
Facilitating Instruction	F1	●	◔	◕	◕	◑	○	◑	◕	◕	◑
	F2	●	○	◔	◔	○	◔	◑	◑	○	◔
	F3	●	◔	◑	◕	◔	○	◑	◕	◔	◑
	F4	●	◔	◑	◔	○	○	◕	◔	○	◔
	F5	◑	◔	◑	◕	◕	◔	◑	●	◔	◑
	F6	●	◕	◕	●	●	◔	◕	◕	●	◕
Facilitating Instruction Total		●	◔	◑	◑	◑	◔	◑	◕	◑	◑
Equity and Accessibility	E1	●	○	◑	◕	◔	○	○	◕	◔	◑
	E2	●	◔	◑	◑	◔	○	◑	◕	◔	◑
	E3	◕	○	◔	◔	◔	○	○	◑	◑	◔
	E4	●	●	◕	◕	◕	◑	●	●	◕	◕
	E5	●	●	◕	◕	◕	◔	●	●	●	◕
	E6	●	●	◕	◕	◕	◔	●	●	●	◕
Equity and Accessibility Total		●	◑	◑	◕	◑	◔	◑	◕	◑	◑
Assessment	A1	●	○	◔	◑	◔	◔	◕	◑	◔	◑
	A2	◕	◔	◑	◑	◑	◔	◕	◑	◔	◑
	A3	●	◑	◔	◔	○	◔	◕	◑	◑	◑
	A4	◕	◑	◑	◕	◑	◔	◕	◑	◔	◑
	A5	●	◔	◑	◔	◑	◔	◕	◑	◔	◑
	A6	●	◔	◕	◑	◑	◔	◕	◑	◔	◑
Assessment Total		●	◔	◑	◑	◑	◔	◕	◑	◔	◑

Figure 35. High School Chemistry Key Program Elements.

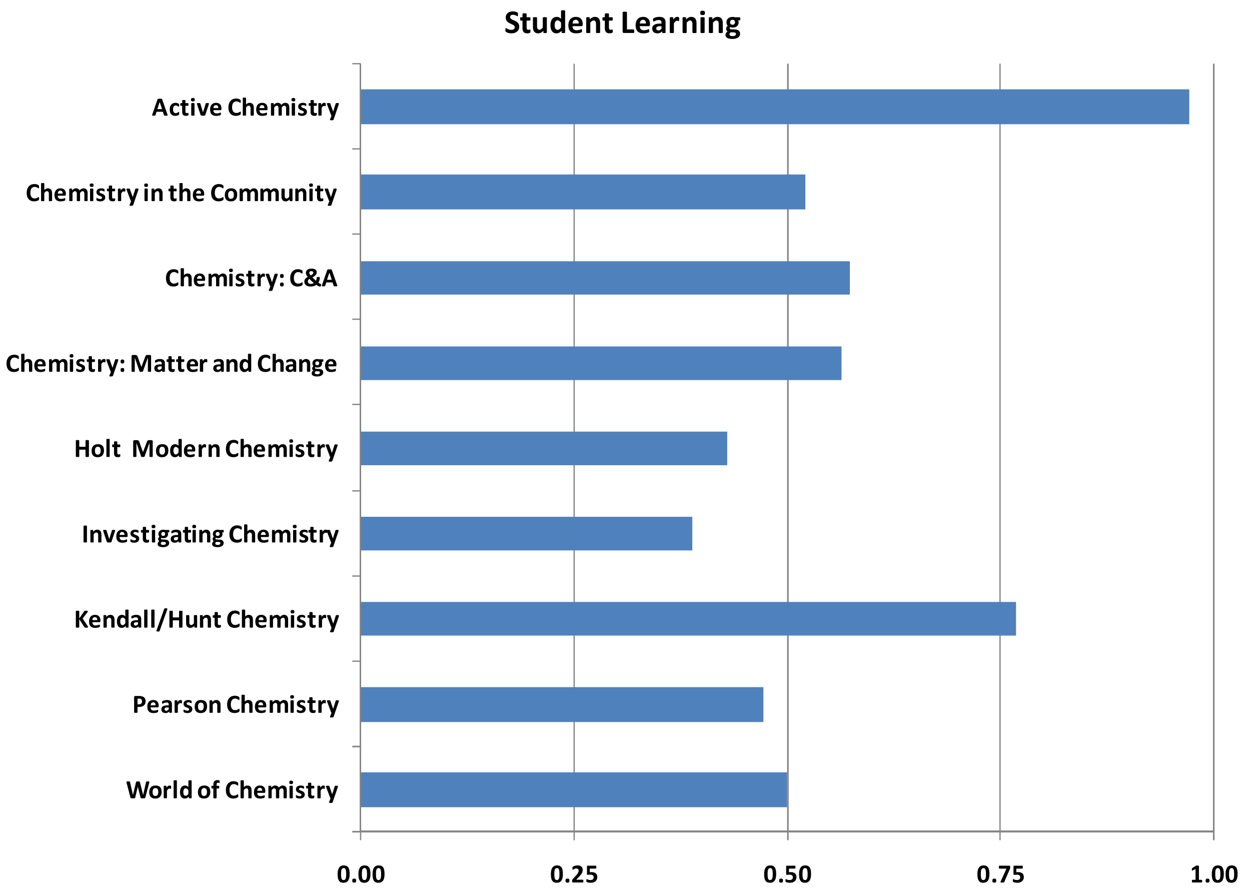


Figure 36. High School Chemistry Student Learning.

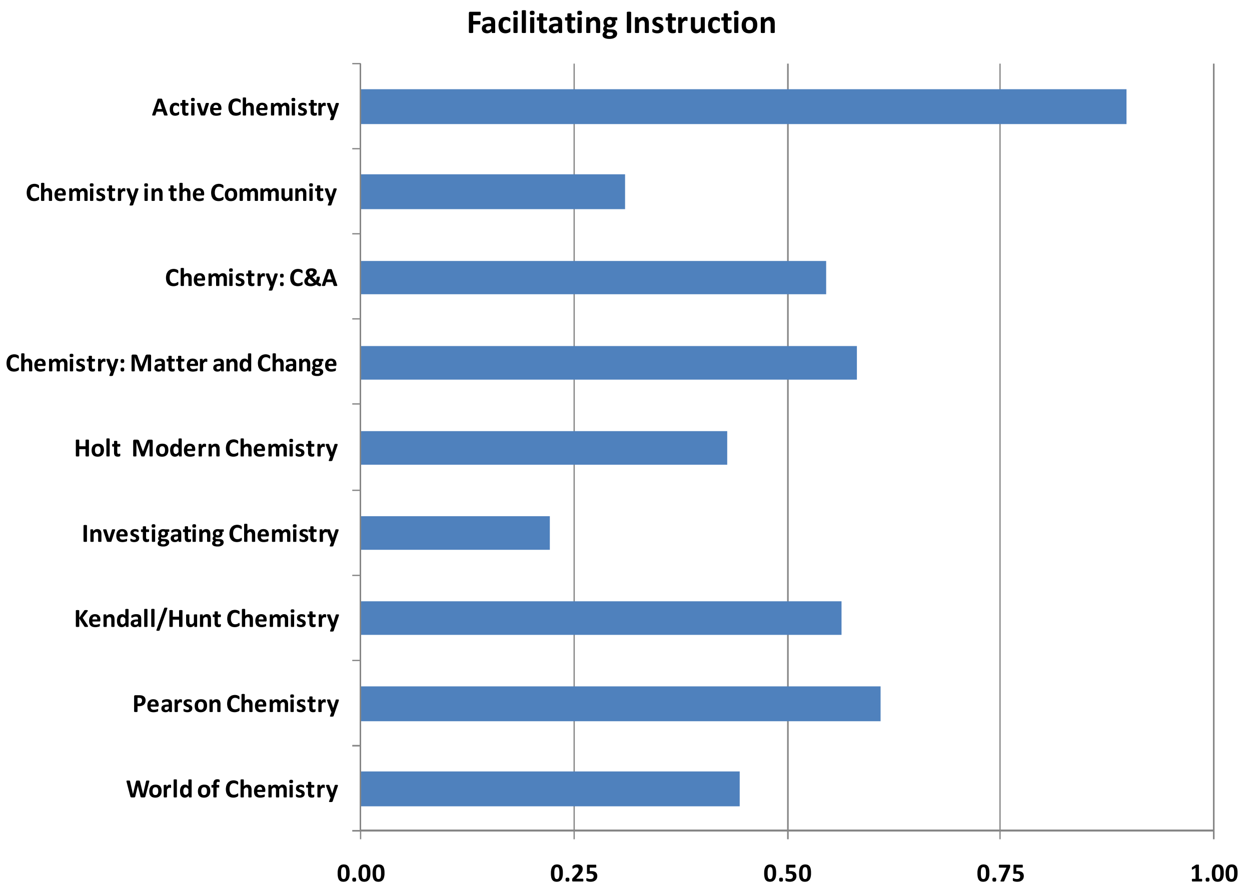


Figure 37. High School Chemistry Facilitating Instruction.

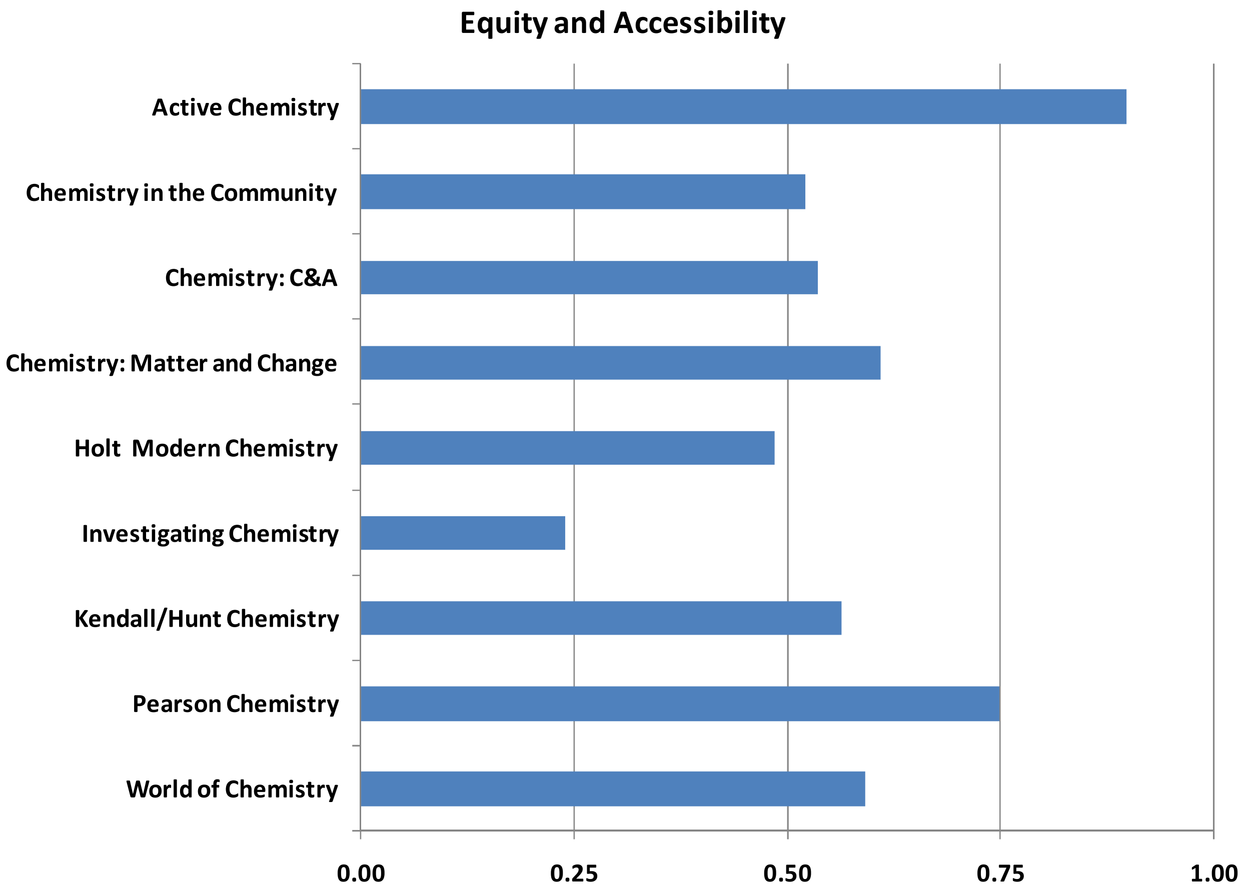


Figure 38. High School Chemistry Equity and Accessibility.

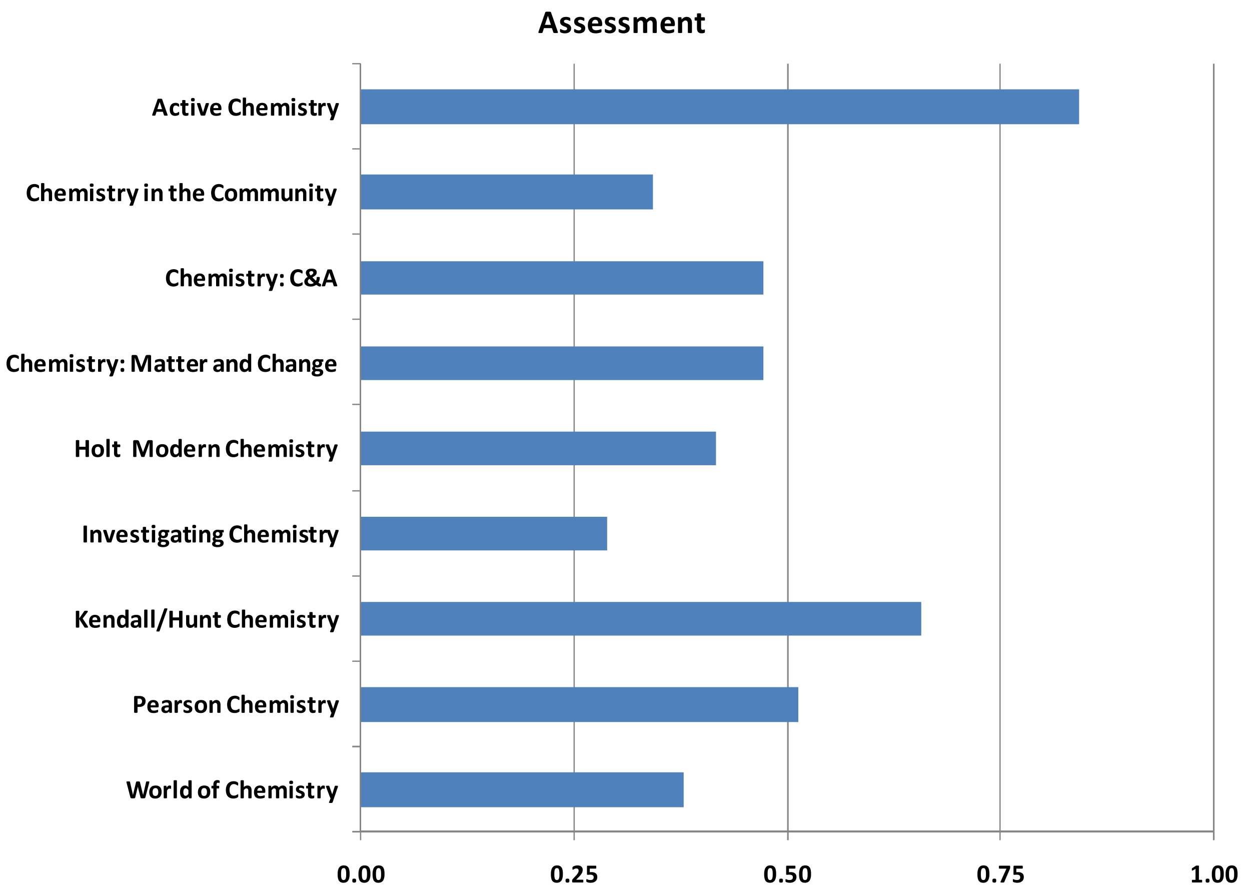


Figure 39. High School Chemistry Assessment.

3.3.2.3 Earth Science

All High School Earth Science Results for Key Program Elements										
Scale	**Item**	**Discovering the Universe**	**EarthComm**	**Essential Earth**	**Glencoe Earth Science: GEU**	**Holt Earth Science**	**McGraw-Hill Earth & Space Science**	**Pearson Earth Science**	**Science of Earth Systems**	**Grand Total**
Student Learning	S1	◔	●	○	◕	◑	○	◔	○	◔
	S2	◔	●	○	◑	◕	◔	◔	○	◔
	S3	◔	●	○	◕	◕	●	◑	◕	◕
	S4	◔	●	○	◑	◑	○	◔	○	◔
	S5	◔	●	○	◑	◑	◔	◑	○	◔
	S6	○	◕	○	◑	◑	◔	◑	○	◔
Student Learning Total		◔	●	○	◑	◑	◔	◑	◔	◑
Facilitating Instruction	F1	○	●	○	◕	◑	◑	◑	○	◑
	F2	○	●	○	◑	◔	○	○	○	◔
	F3	○	◑	○	◑	◑	◑	◑	○	◔
	F4	○	●	○	◔	◑	○	○	○	◔
	F5	◑	●	○	●	◕	◑	◑	◑	◑
	F6	○	●	○	●	◕	◑	◕	◔	◑
Facilitating Instruction Total		○	●	○	◕	◑	◔	◔	○	◔
Equity and Accessibility	E1	○	◔	○	◑	◑	◑	◑	○	◔
	E2	○	◑	○	◕	◑	◑	◑	○	◔
	E3	○	○	○	◑	◑	◑	◑	◔	◔
	E4	◔	◕	●	◕	◕	●	◑	◕	◕
	E5	◔	◕	●	◕	◕	●	◑	◕	◕
	E6	◔	◕	●	◕	◕	●	◑	●	◕
Equity and Accessibility Total		○	◑	◑	◕	◑	◕	◑	◑	◑
Assessment	A1	◔	●	○	◑	◑	◑	○	○	◔
	A2	○	●	○	◑	◕	◑	◔	◔	◑
	A3	◑	◕	○	◔	◑	◔	◔	○	◔
	A4	○	●	○	◑	◑	◑	◔	◔	◑
	A5	○	●	○	◑	◕	◔	○	○	◔
	A6	○	●	○	◑	◕	◑	○	○	◔
Assessment Total		○	●	○	◑	◑	◑	◔	○	◔

Figure 40. High School Earth Science Key Program Elements.

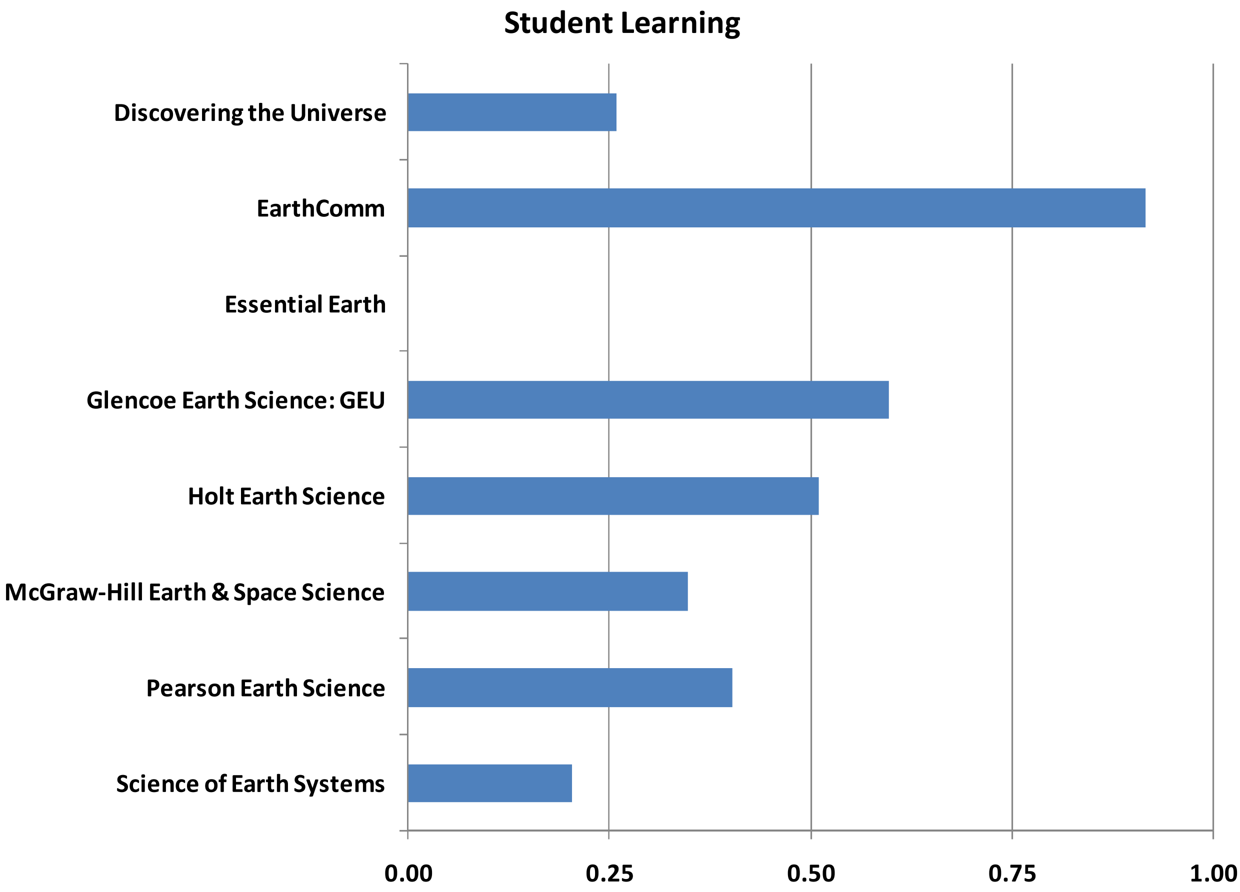


Figure 41. High School Earth Science Student Learning.

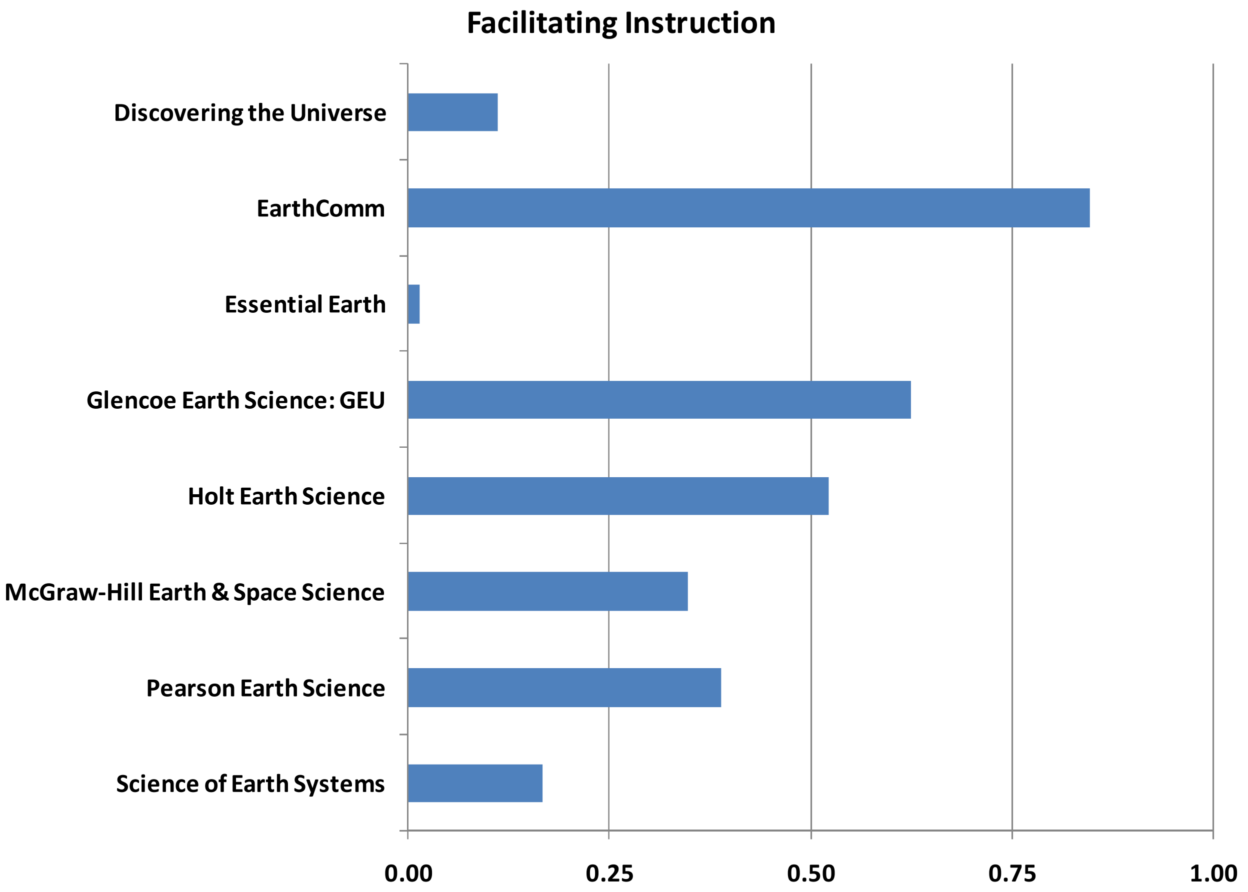


Figure 42. High School Earth Science Facilitating Instruction.

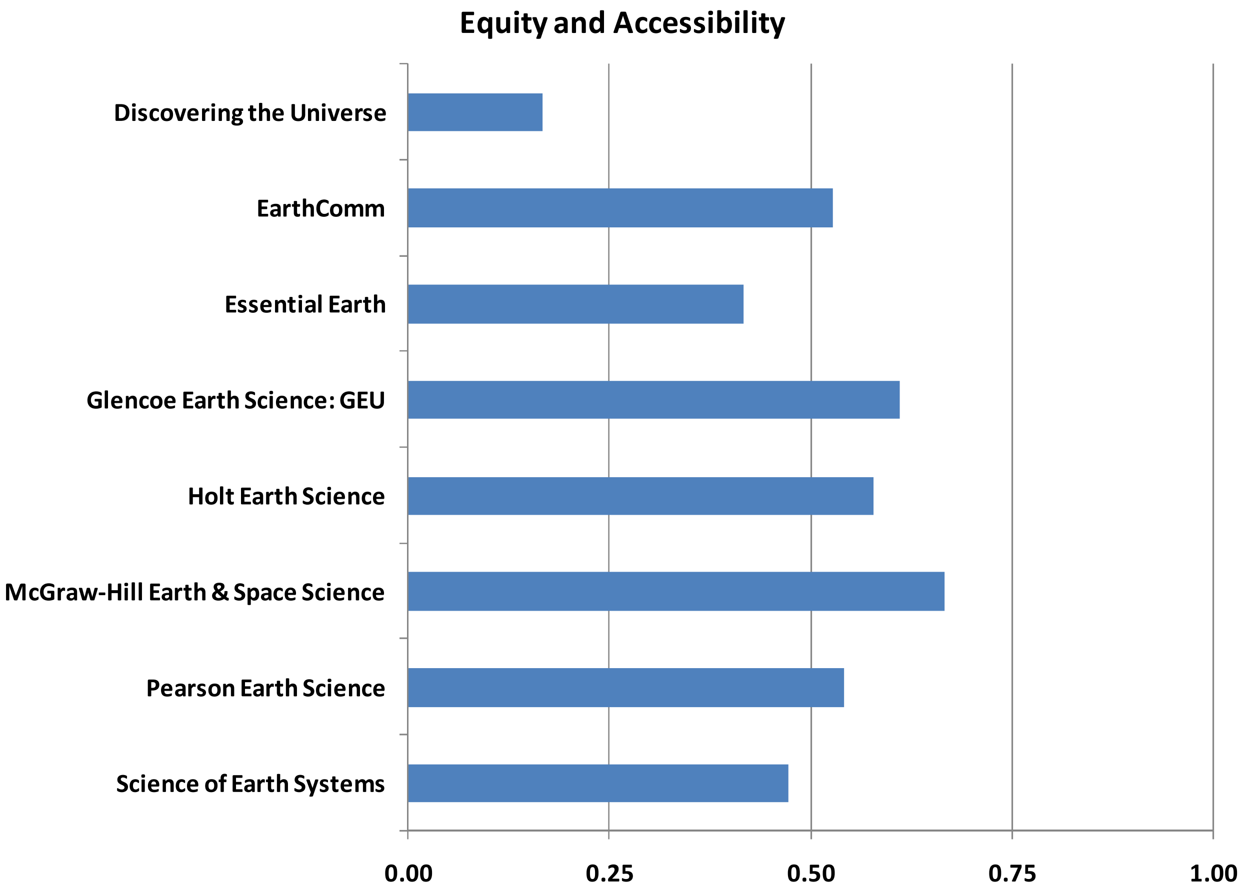


Figure 43. High School Earth Science Equity and Accessibility.

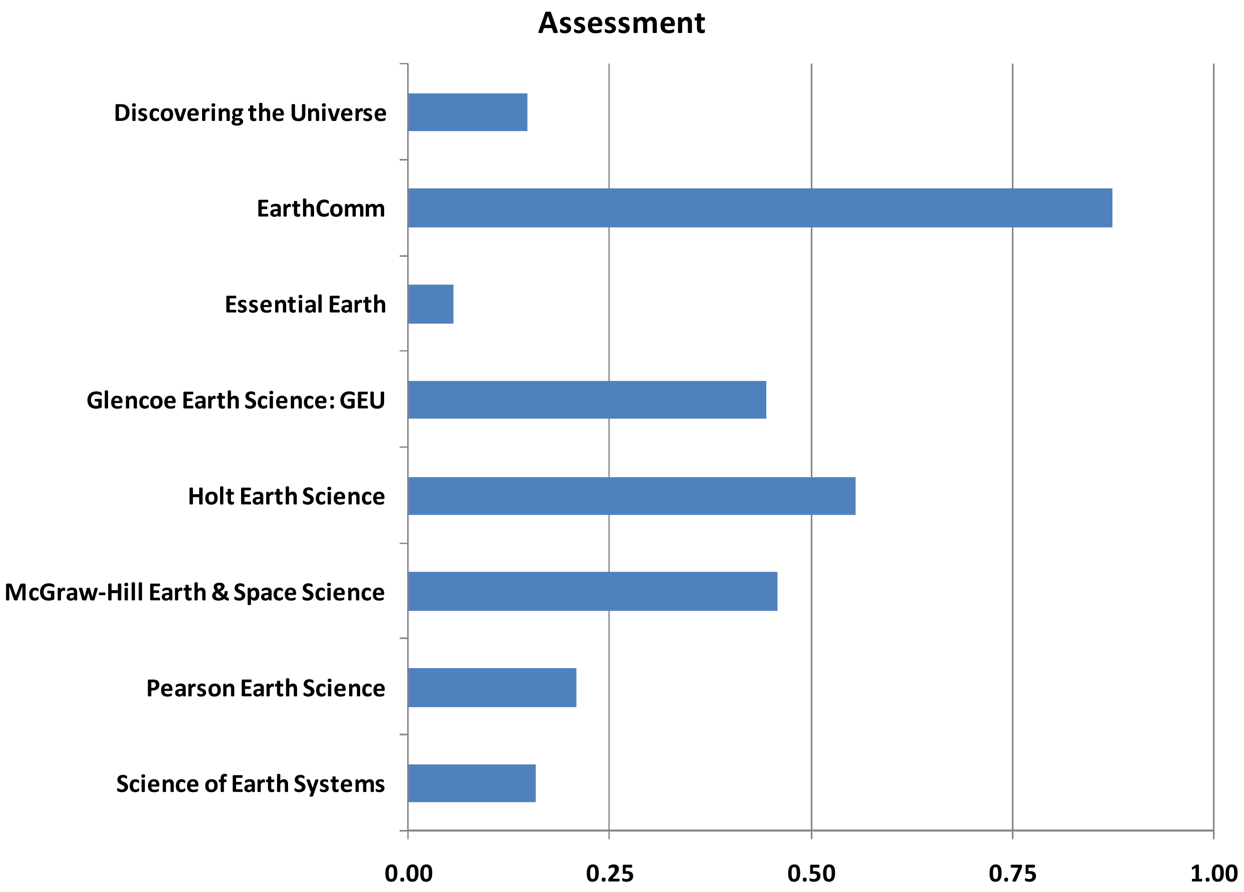


Figure 44. High School Earth Science Assessment.

3.3.2.4 Physical Science

All High School Physical Science Results for Key Program Elements											
Scale	**Item**	**Active Physical Science**	**Conceptual Physical Science**	**Foundations of Physical Science**	**Glencoe Physical Sci w/ Earth Sci**	**Glencoe Physical Science**	**Holt Physical Science**	**Holt Physical, Earth & Space**	**McGraw-Hill Physical Science**	**Pearson Physical Science**	**Grand Total**
Student Learning	S1	◕	◔	◕	◑	◔	◑	◔	◑	◑	◑
	S2	●	◑	●	◕	◕	◕	◑	◑	◑	◕
	S3	●	◑	◑	◕	●	◕	◕	◕	◕	◕
	S4	◕	◔	◑	◑	◔	◑	◔	◔	◔	◔
	S5	●	◑	●	◑	◕	◕	◑	◑	◑	◕
	S6	●	◑	◕	◑	◑	◕	◑	◑	◑	◑
Student Learning Total		●	◑	◕	◑	◑	◕	◑	◑	◑	◑
Facilitating Instruction	F1	●	◑	◑	◑	◕	◑	◑	◑	◑	◕
	F2	●	◔	◑	◔	◔	◔	◑	◔	○	◔
	F3	◕	○	◑	◕	◕	◕	◕	◑	◑	◕
	F4	◕	○	◑	◔	◔	◑	◔	○	◔	◔
	F5	◑	◔	◑	◕	●	◕	◕	◕	◕	◕
	F6	●	◑	●	◑	●	●	◕	◕	◕	◕
Facilitating Instruction Total		◕	◔	◑	◑	◕	◕	◑	◑	◑	◑
Equity and Accessibility	E1	◑	○	◔	●	◑	◕	◕	◑	◕	◑
	E2	◕	◔	◕	◕	◑	◕	◑	◑	◑	◑
	E3	○	○	○	◑	◑	◑	◑	◔	◑	◔
	E4	●	◑	◕	◕	●	●	◕	◕	◕	◕
	E5	●	◑	◕	◕	◕	◕	◕	◑	●	◕
	E6	●	◑	◕	◕	◕	●	◕	◑	●	◕
Equity and Accessibility Total		◕	◔	◑	◕	◕	◕	◕	◑	◕	◕
Assessment	A1	●	◔	◑	◑	◔	◑	◑	◑	◔	◑
	A2	●	○	◑	◔	◔	◑	◑	◑	◔	◑
	A3	◕	◔	◑	◑	◔	◑	◑	◔	◔	◑
	A4	●	◑	◑	◑	◑	◕	◑	◑	◔	◑
	A5	●	○	◕	◑	◔	◑	◔	◑	◔	◑
	A6	◑	◔	◑	◑	◑	◑	◑	◑	◔	◑
Assessment Total		◕	◔	◑	◑	◔	◑	◑	◑	◔	◑

Figure 45. High School Physical Science Key Program Elements.

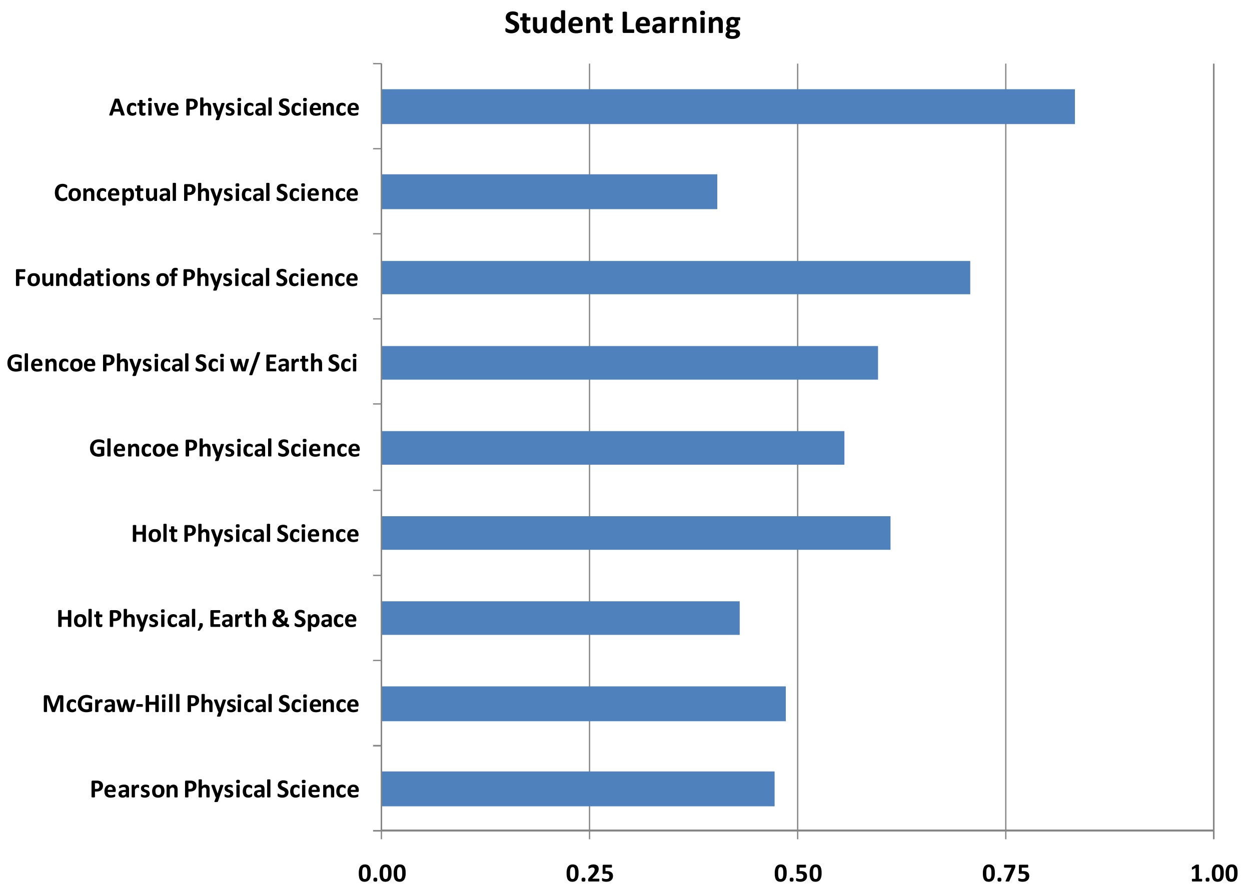


Figure 46. High School Physical Science Student Learning.

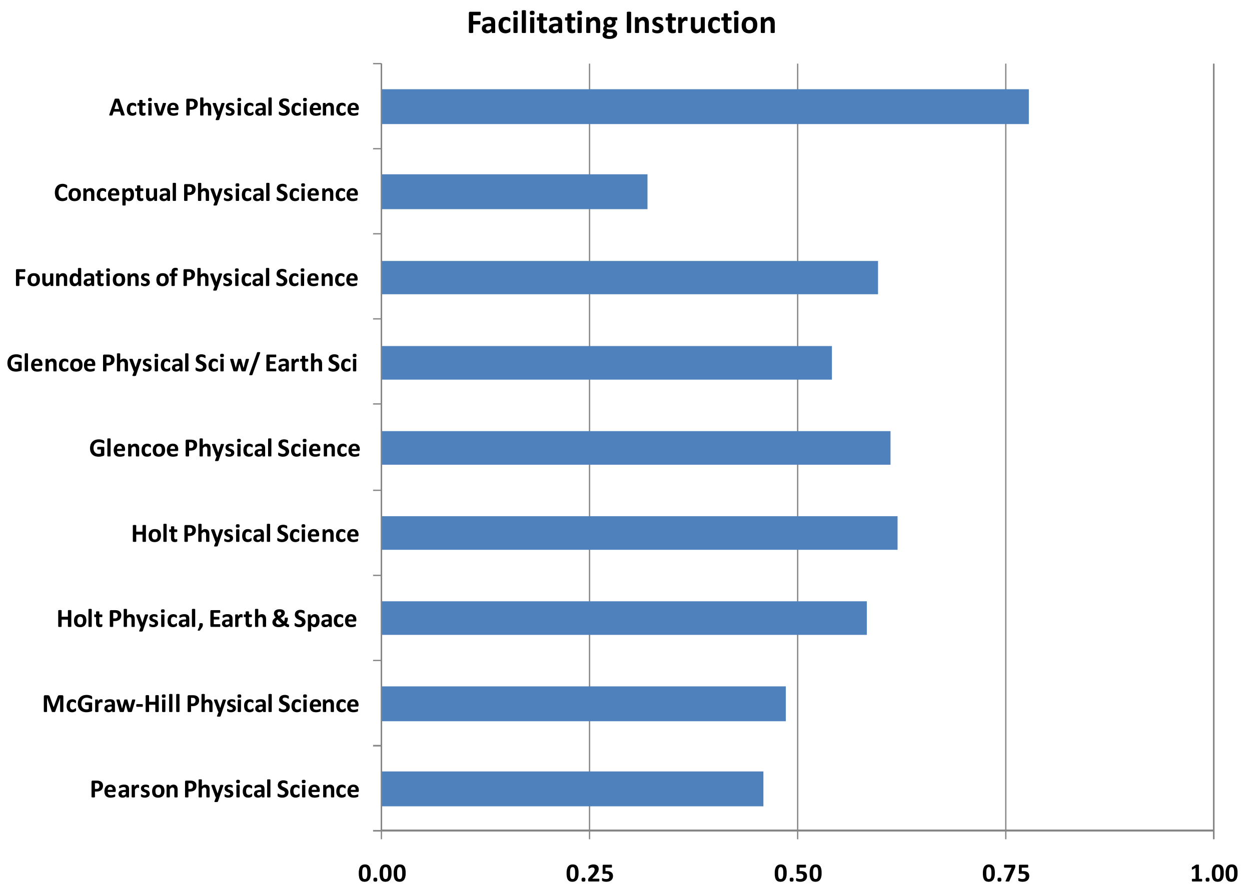


Figure 47. High School Physical Science Facilitating Instruction.

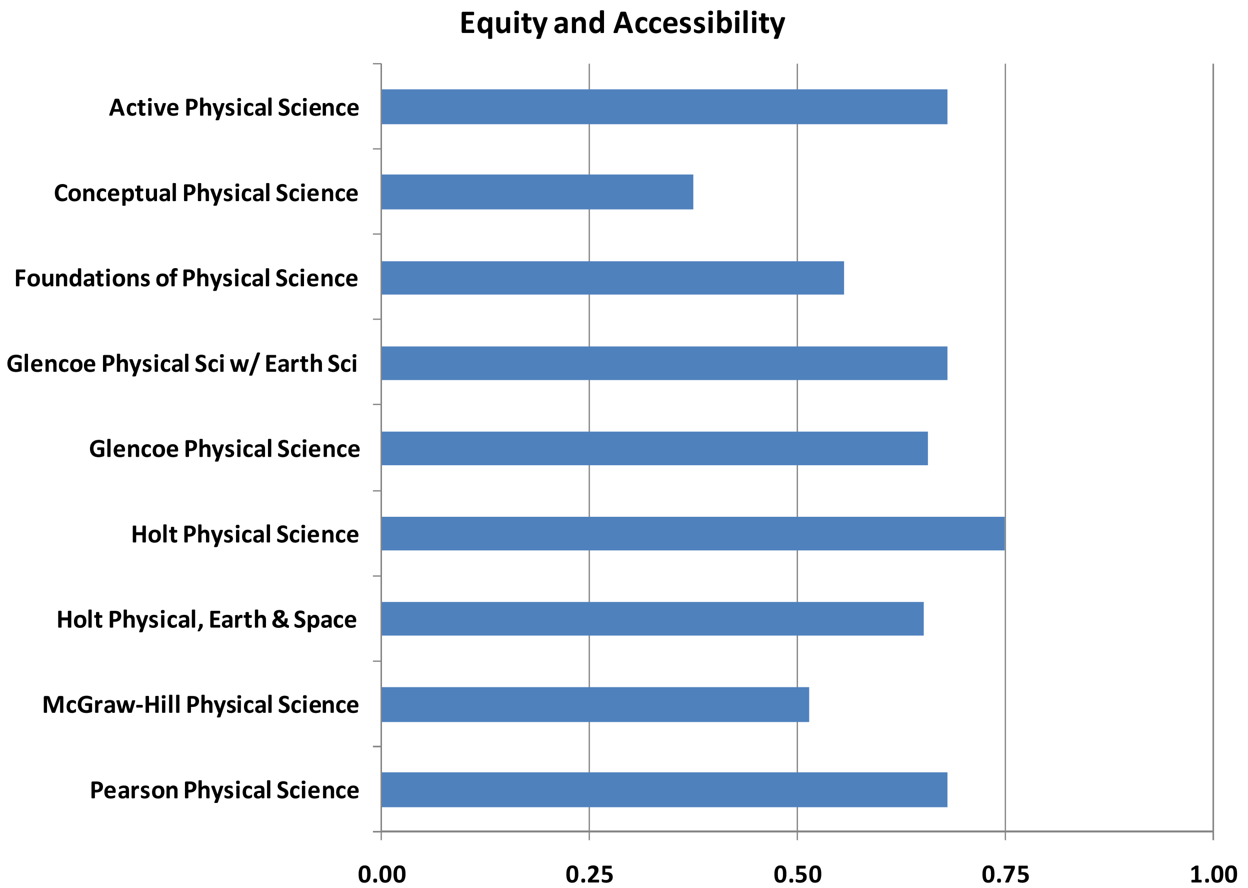


Figure 48. High School Physical Science Equity and Accessibility.

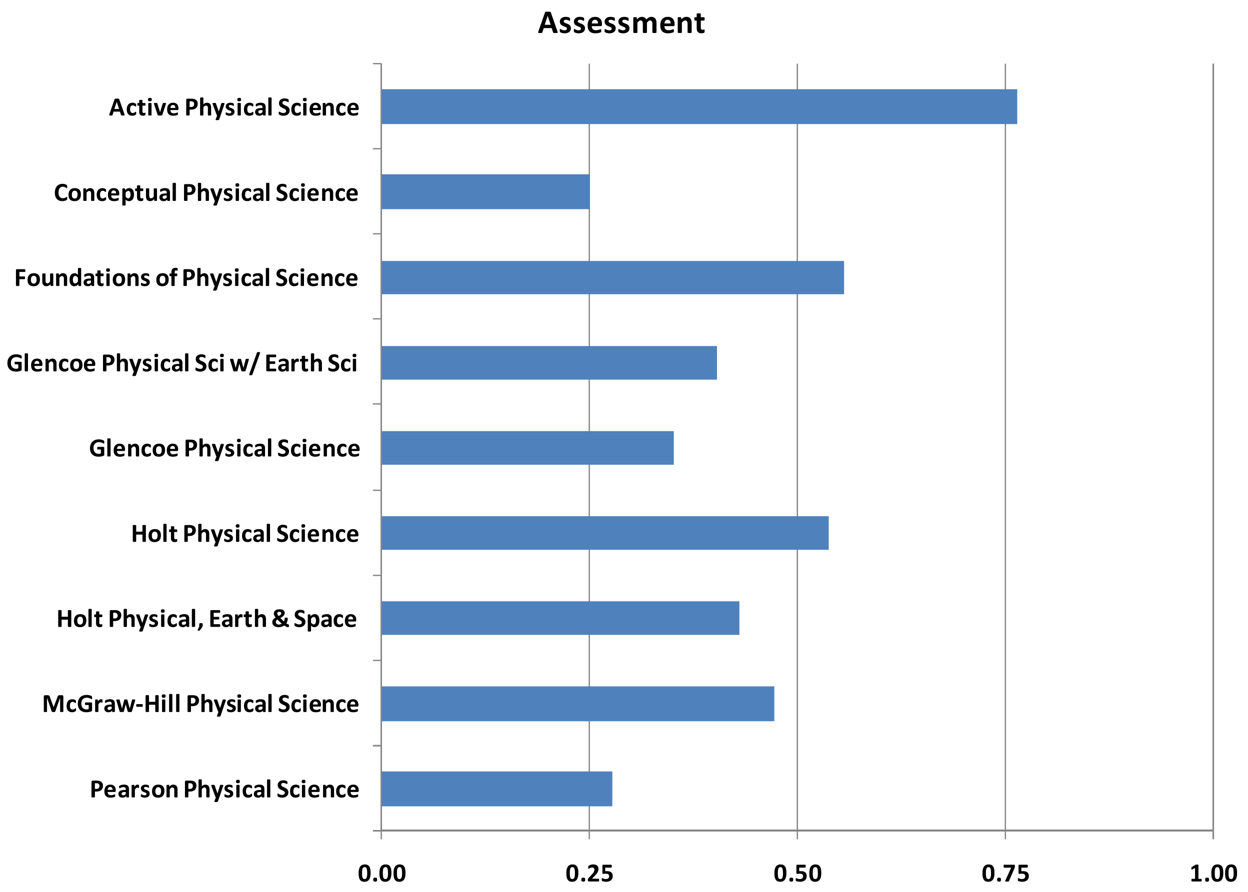


Figure 49. High School Physical Science Assessment.

3.3.2.5 Physics

All High School Physics Results for Key Program Elements								
Scale	**Item**	**Active Physics**	**Conceptual Physics**	**Foundations of Physics**	**Glencoe Physics**	**Holt Physics**	**Physics: A First Course**	**Grand Total**
Student Learning	S1	●	◔	◕	◔	◑	◑	◑
	S2	●	◑	◕	◔	◑	◑	◕
	S3	●	◑	◕	◕	●	◕	◕
	S4	●	○	◕	◑	◑	◔	◑
	S5	●	◔	◑	◑	◑	◔	◑
	S6	●	◑	◕	◑	◕	◑	◕
Student Learning Total		●	◑	◕	◑	◕	◑	◑
Facilitating Instruction	F1	●	◑	◕	◔	◑	◔	◑
	F2	●	◔	◑	◔	○	◔	◑
	F3	●	◔	◔	◔	◑	○	◑
	F4	●	○	◔	○	◔	◔	◔
	F5	●	●	◕	◕	◑	◑	◕
	F6	●	●	◕	◑	●	●	●
Facilitating Instruction Total		●	◑	◑	◔	◑	◔	◑
Equity and Accessibility	E1	●	○	○	◔	◑	◔	◔
	E2	●	◔	◔	◔	◑	◔	◑
	E3	◑	○	○	○	◔	○	◔
	E4	●	◕	◑	◑	◕	◕	◕
	E5	●	◕	◔	◑	◕	◕	◕
	E6	●	◕	◑	◑	◕	◕	◕
Equity and Accessibility Total		●	◑	◔	◔	◑	◑	◑
Assessment	A1	●	◔	◑	◔	◔	◔	◑
	A2	●	○	◑	◑	◑	◔	◑
	A3	●	◑	◑	◑	◔	◔	◑
	A4	●	◑	◕	◑	◔	◑	◑
	A5	●	◔	◕	◑	◑	◑	◑
	A6	◕	◑	◑	◑	◑	◔	◑
Assessment Total		●	◔	◕	◑	◔	◔	◑

Figure 50. High School Physics Key Program Elements.

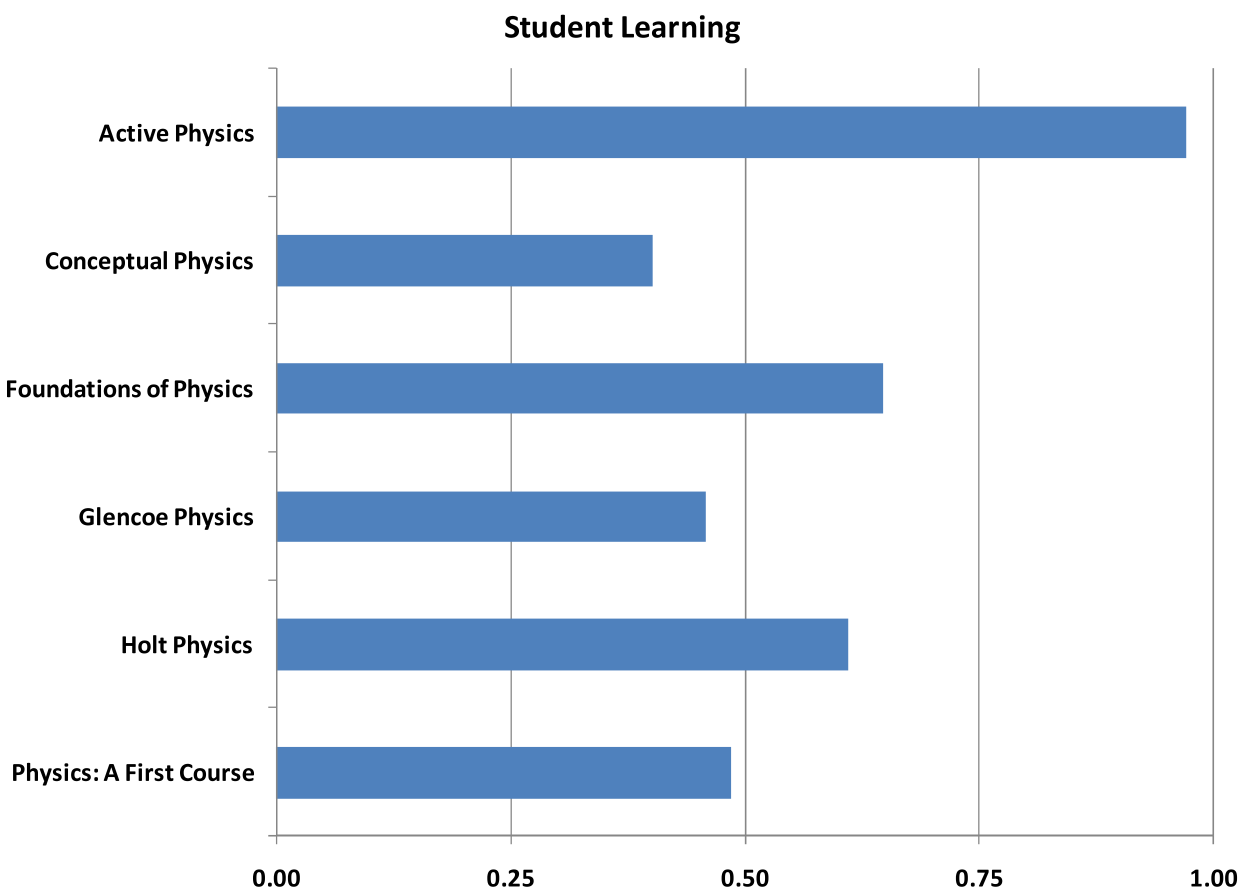


Figure 51. High School Physics Student Learning.

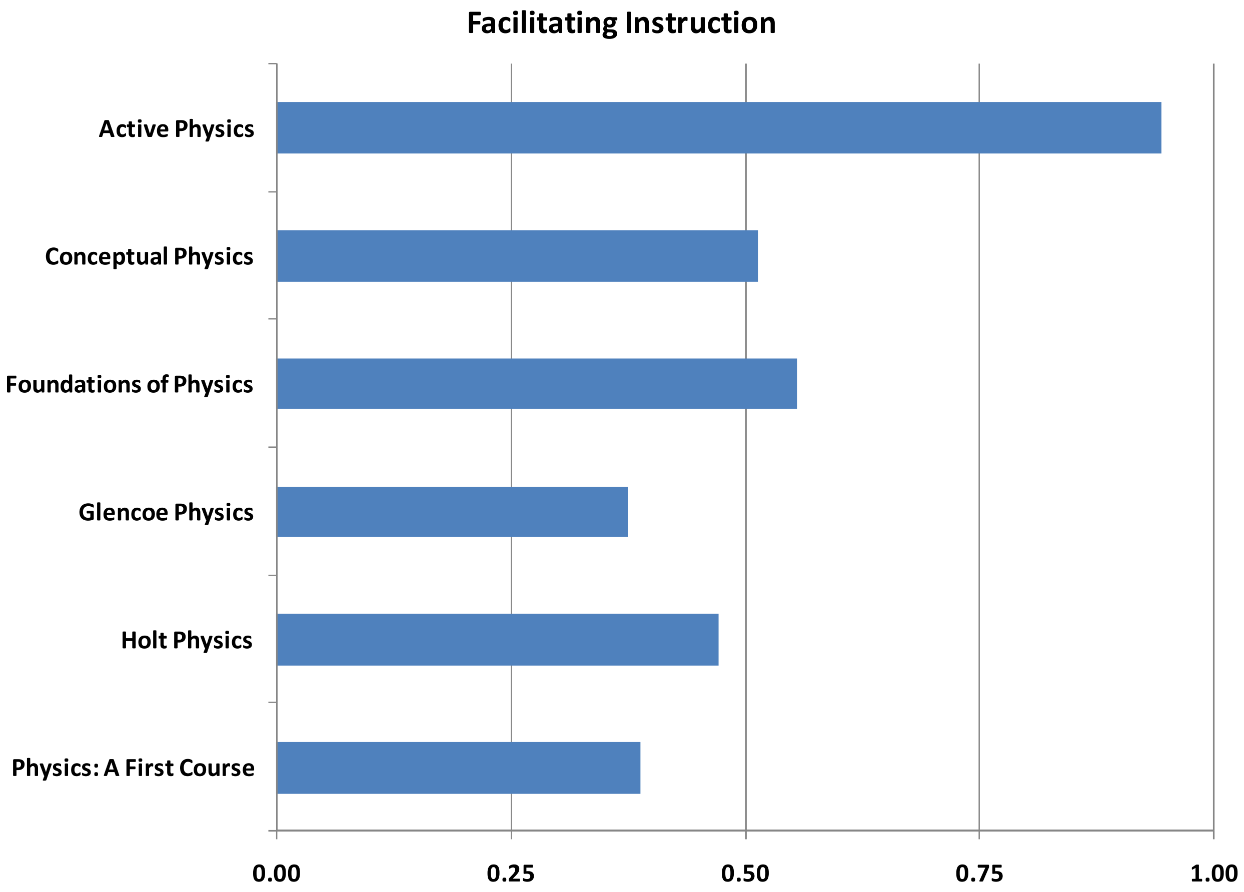


Figure 52. High School Physics Facilitating Instruction.

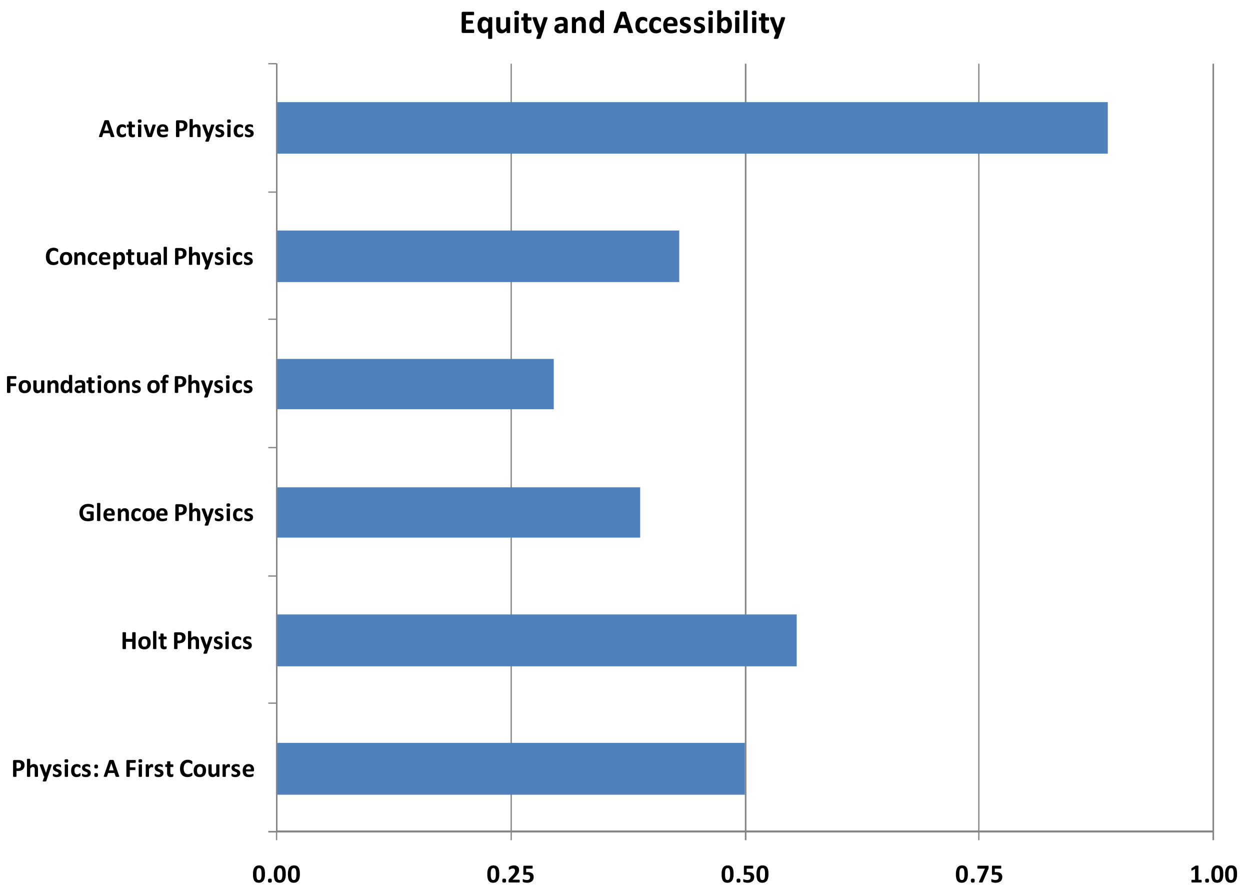


Figure 53. High School Physics Equity and Accessibility.

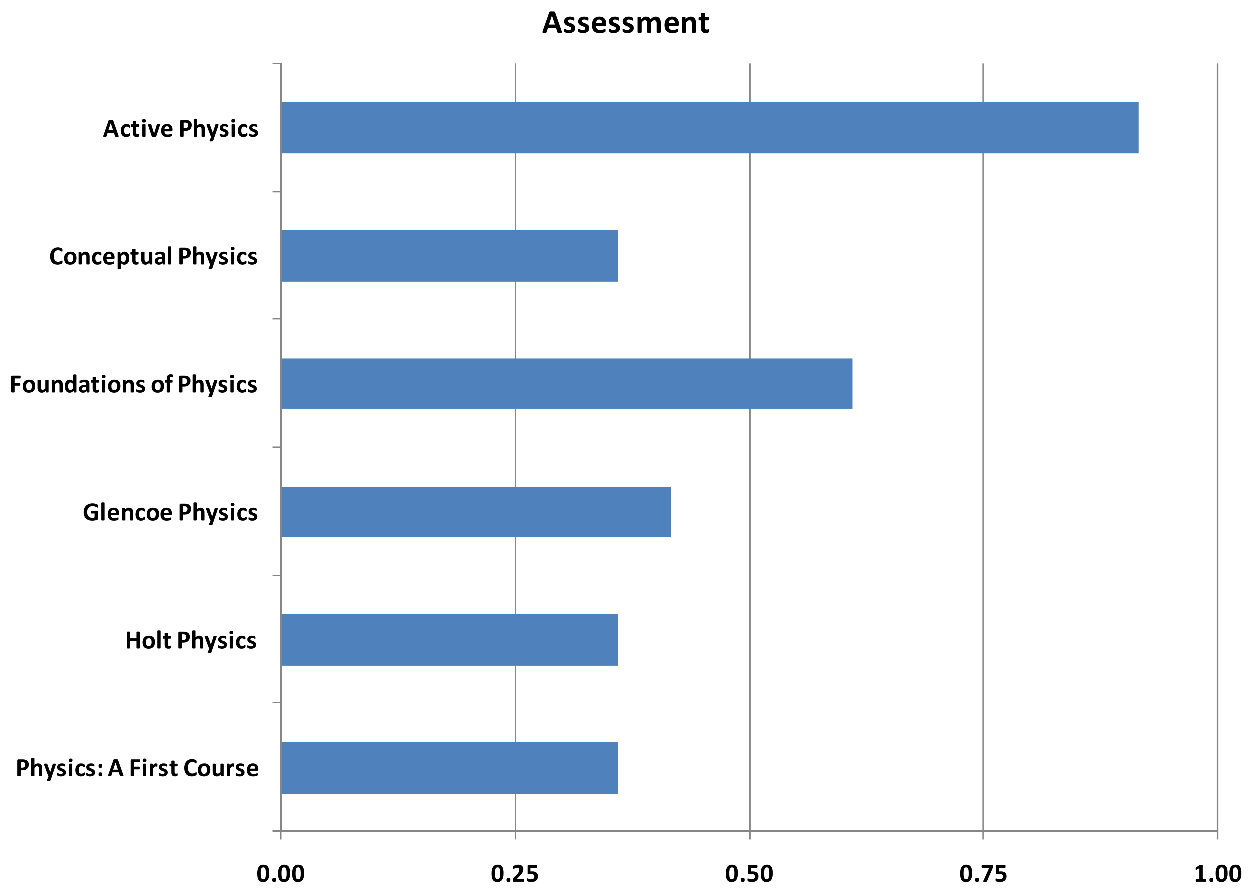


Figure 54. High School Physics Assessment.

3.3.2.6 Integrated

All High School Integrated Results for Key Program Elements						
Scale	**Item**	**Conceptual Integrated Science**	**Coordinated Science**	**Science and Sustainability**	**Science: An Inquiry Approach**	**Grand Total**
Student Learning	S1	◔	●	●	●	●
	S2	◔	●	●	●	◕
	S3	◑	●	●	●	●
	S4	◔	●	●	●	◕
	S5	◔	●	◕	●	◕
	S6	◔	●	●	●	◕
Student Learning Total		◔	●	●	●	◕
Facilitating Instruction	F1	◔	●	◕	●	◕
	F2	○	●	◑	●	◕
	F3	◔	◕	◕	◕	◑
	F4	◔	●	◕	●	◕
	F5	◑	◑	◕	◕	◕
	F6	◑	●	●	●	●
Facilitating Instruction Total		◔	●	◕	●	◕
Equity and Accessibility	E1	○	◑	◔	◑	◑
	E2	◑	◕	◕	◕	◕
	E3	○	◔	○	◑	◔
	E4	◑	●	●	●	●
	E5	◑	●	◕	●	◕
	E6	◕	●	◕	●	◕
Equity and Accessibility Total		◑	◕	◑	◕	◕
Assessment	A1	◑	●	◑	◕	◕
	A2	◑	●	●	◕	◕
	A3	◔	●	◕	●	◕
	A4	◑	●	●	●	◕
	A5	◔	●	◕	◕	◕
	A6	◔	●	●	●	◕
Assessment Total		◔	●	◕	●	◕

Figure 55. High School Integrated Key Program Elements.

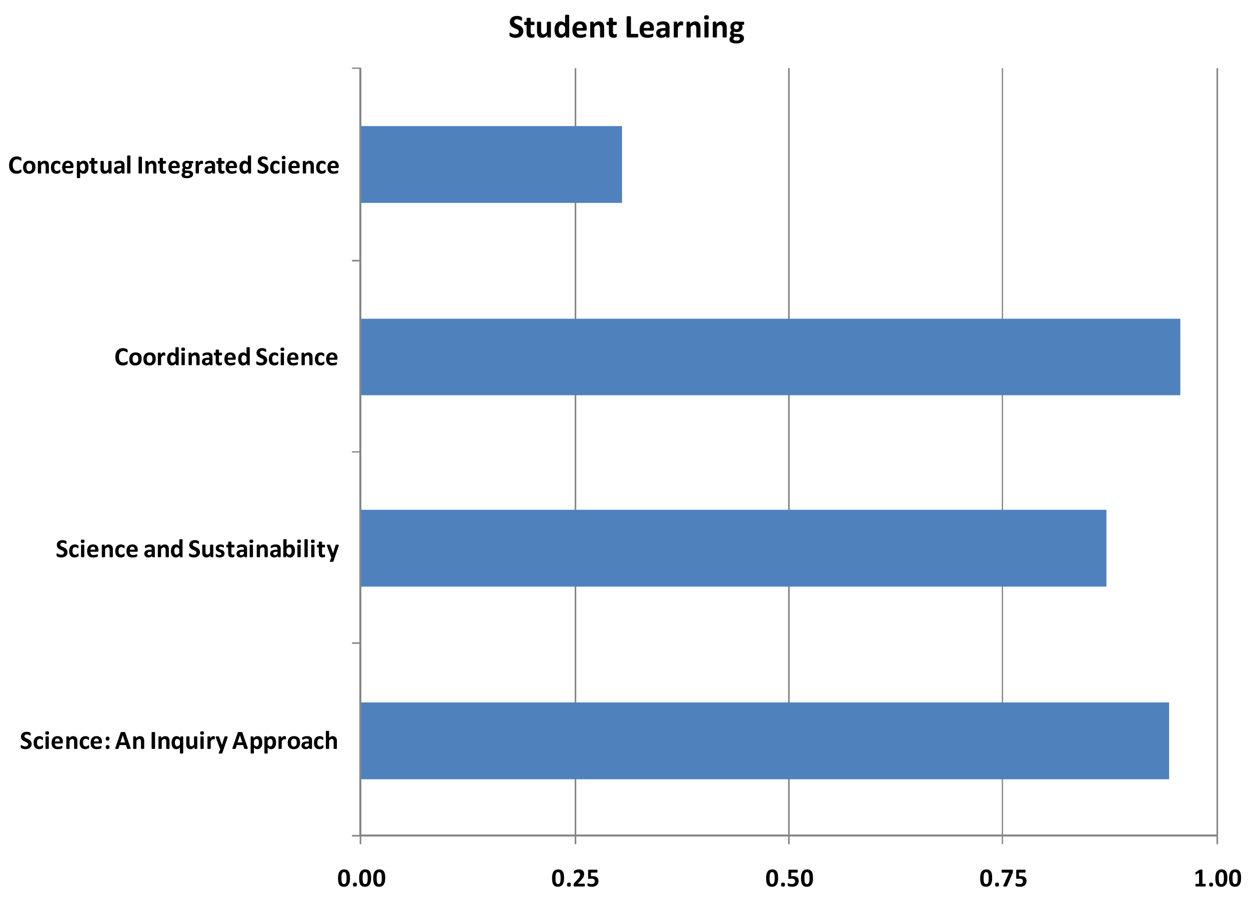


Figure 56. High School Integrated Student Learning.

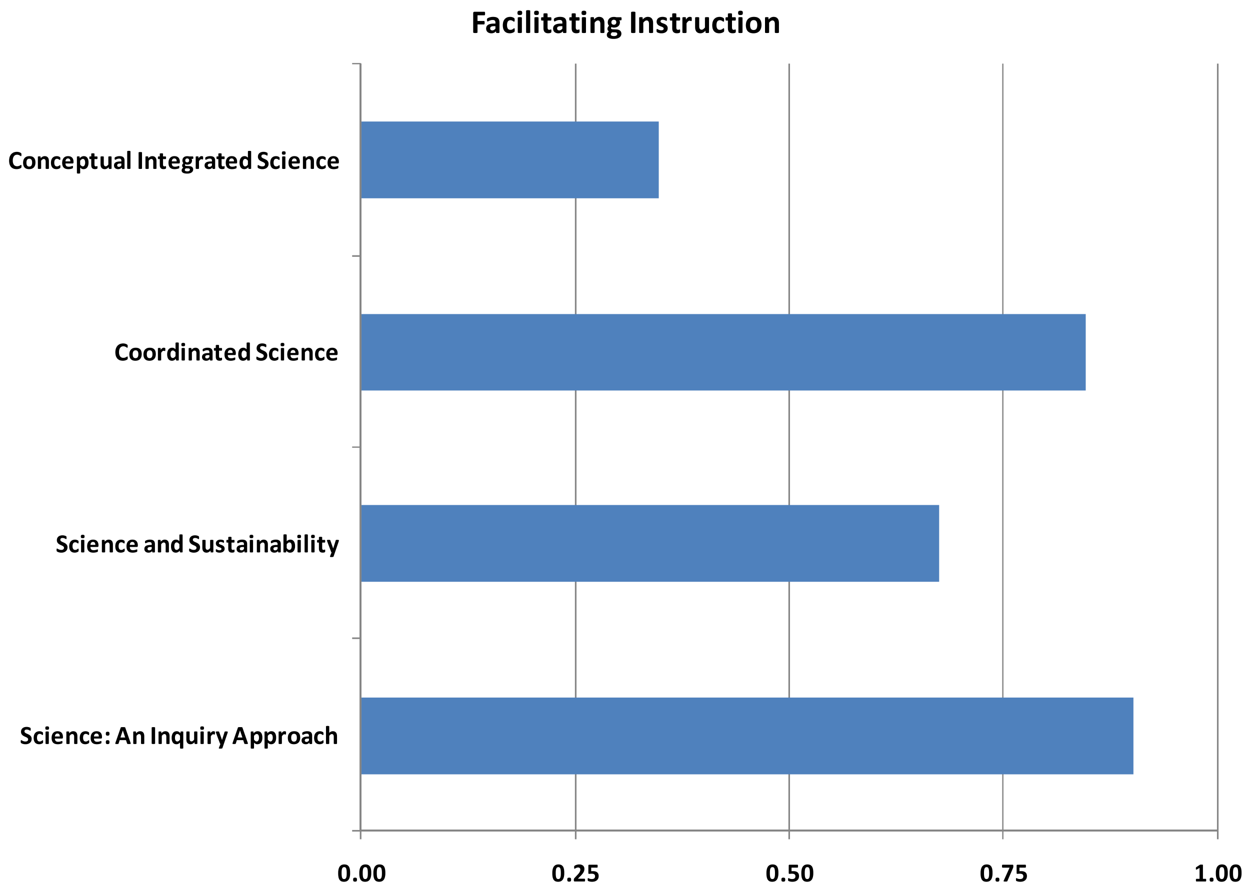


Figure 57. High School Integrated Facilitating Instruction.

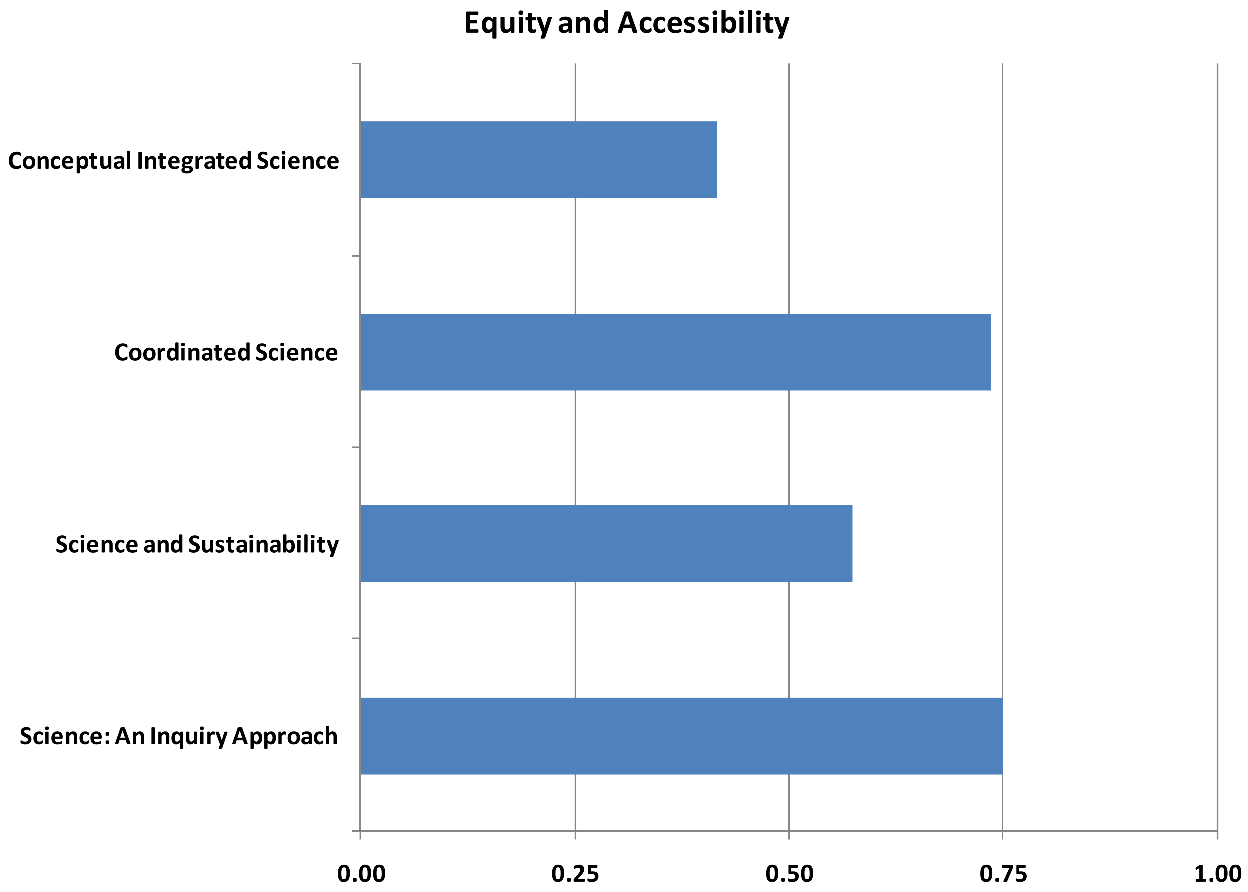


Figure 58. High School Integrated Equity and Accessibility.

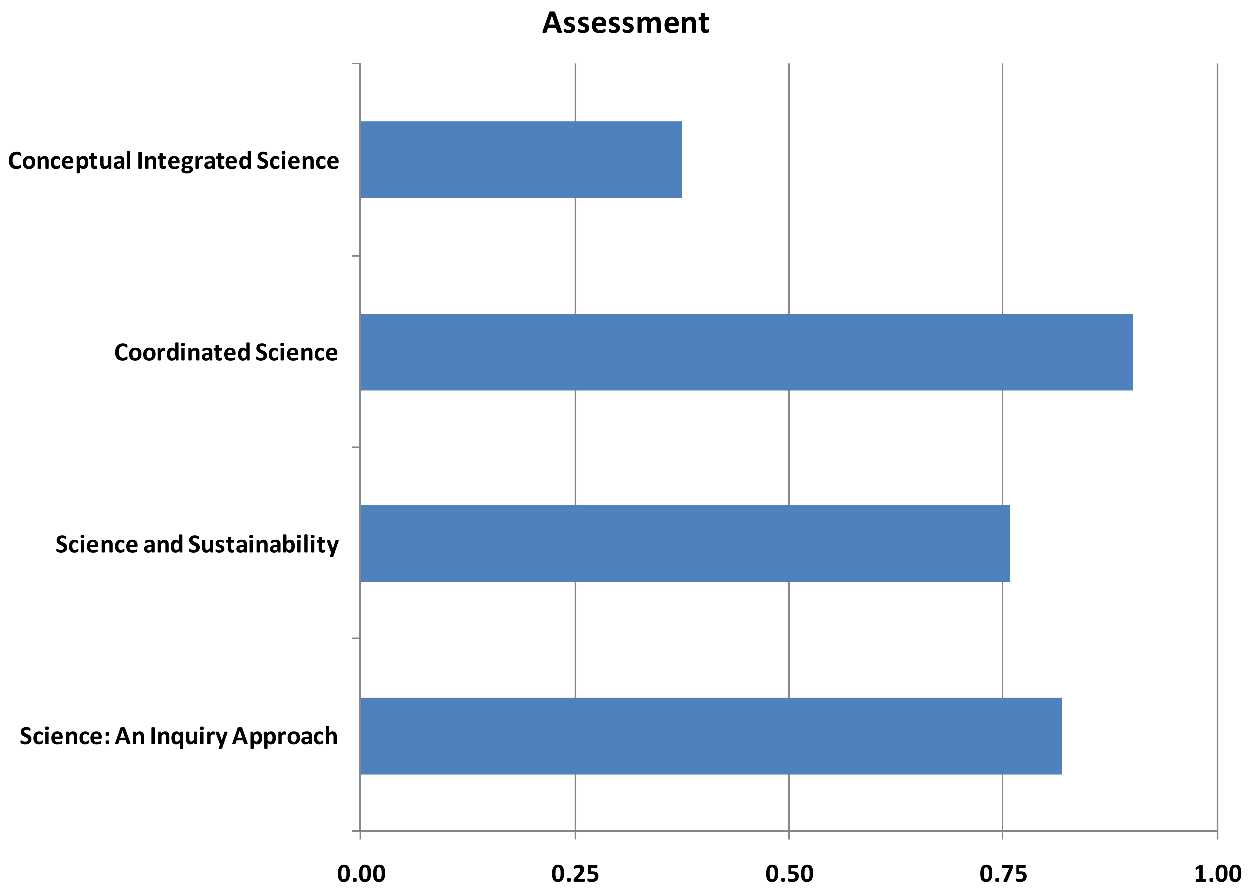
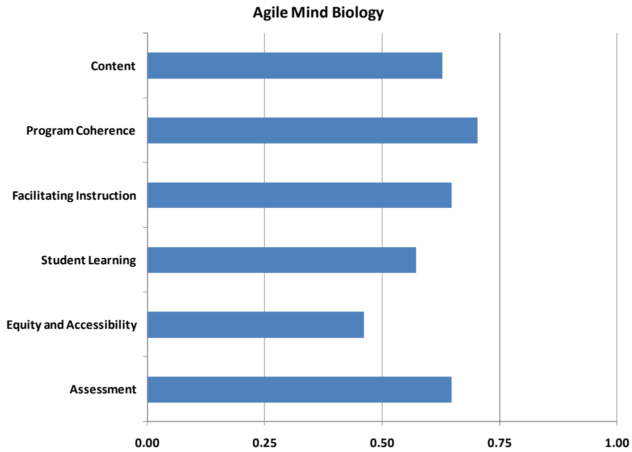
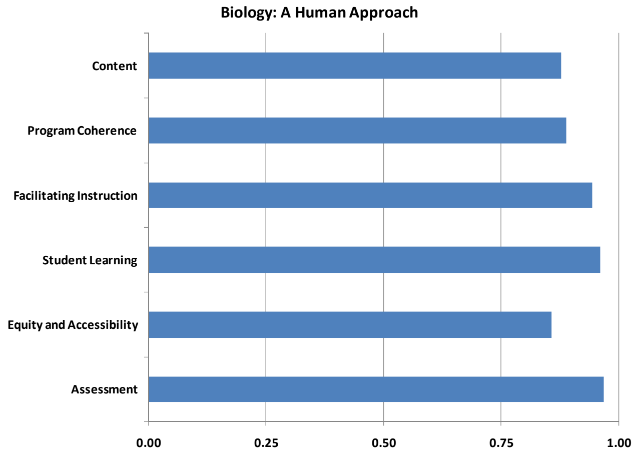


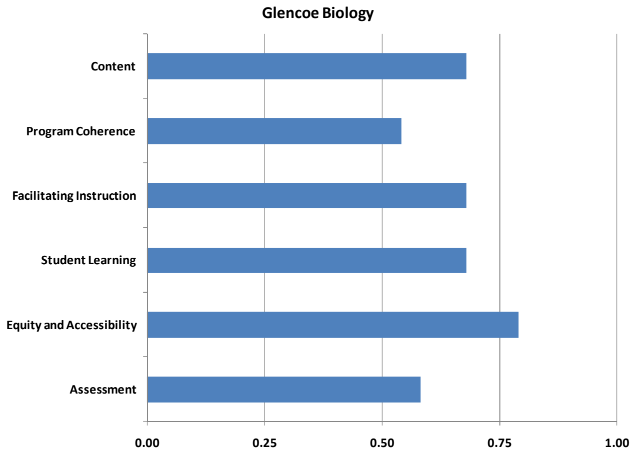
Figure 59. High School Integrated Assessment.

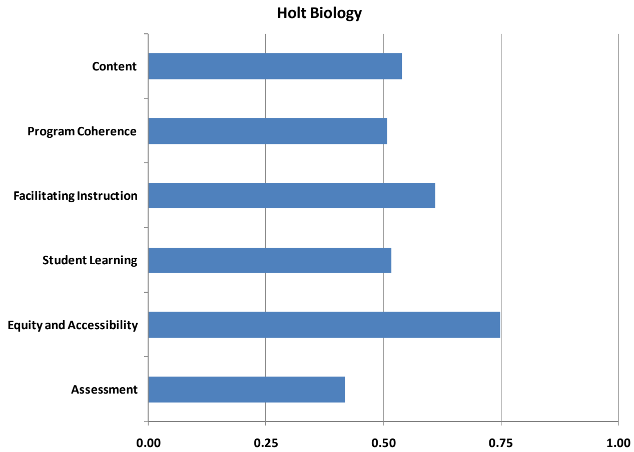
3.3.3 Individual Publisher Series

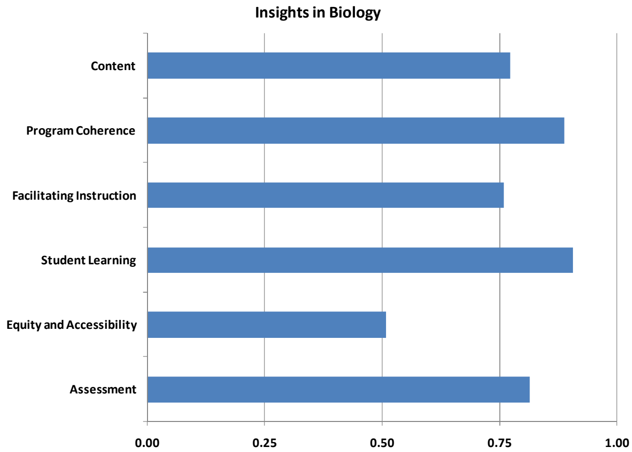
3.3.3.1 Biology

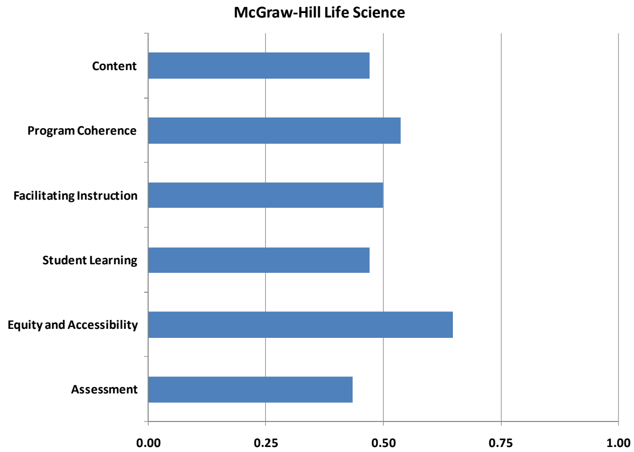


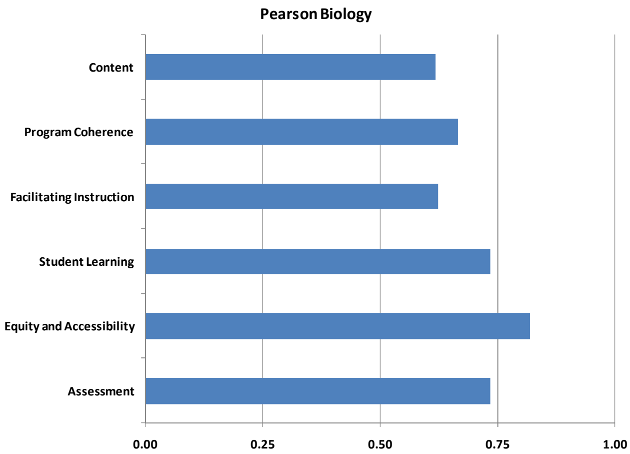


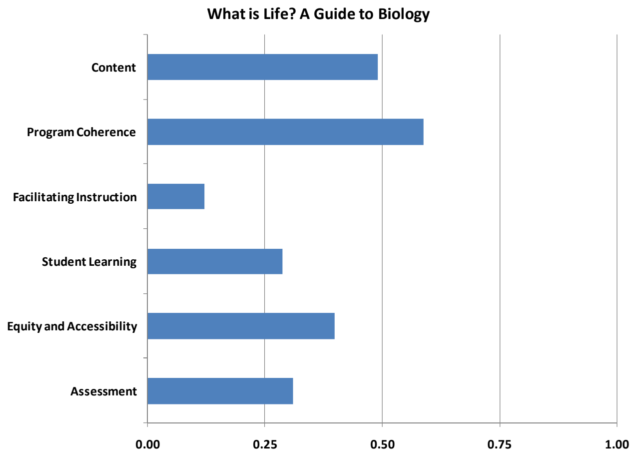




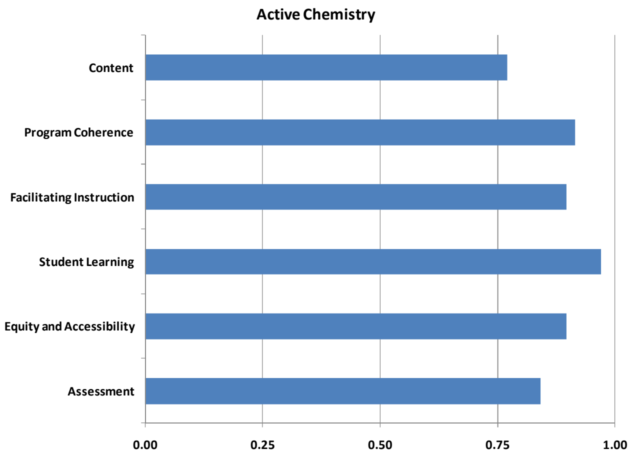


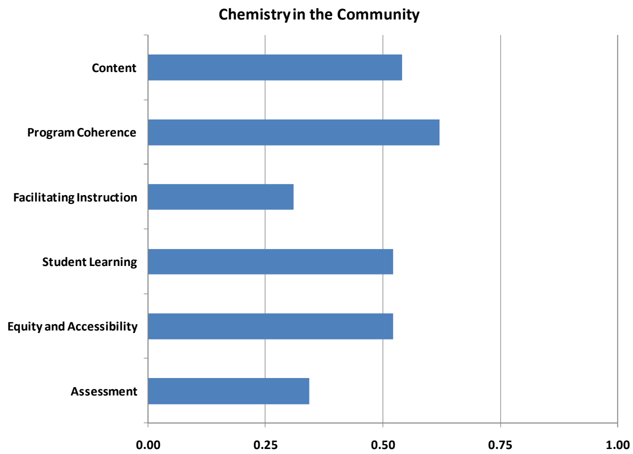


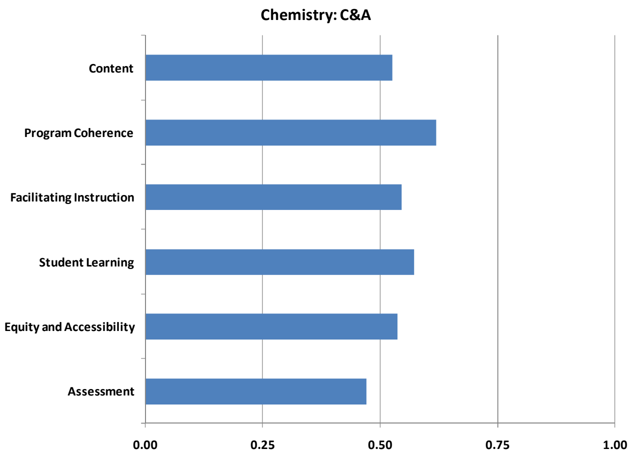


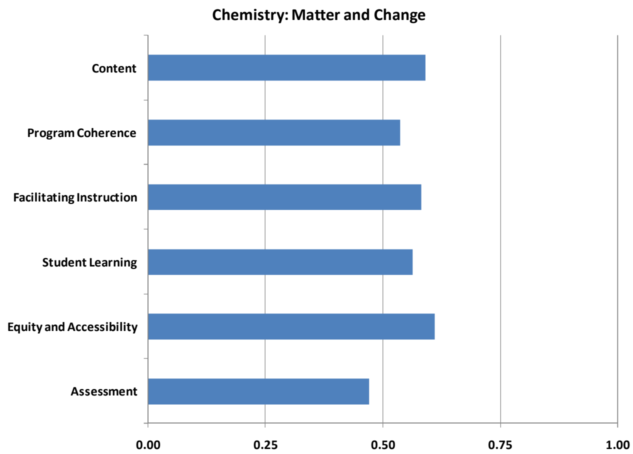


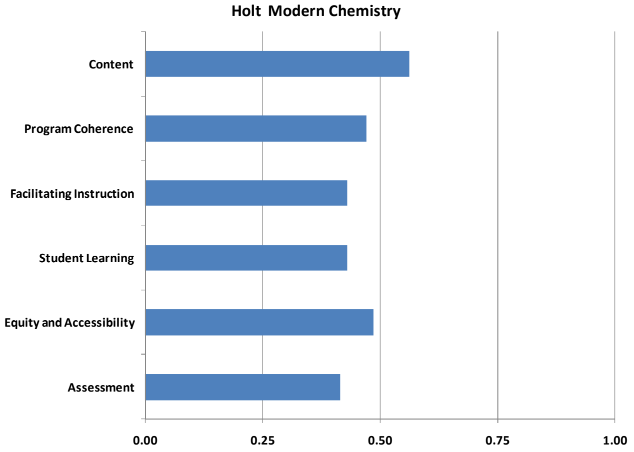
3.3.3.2 Chemistry







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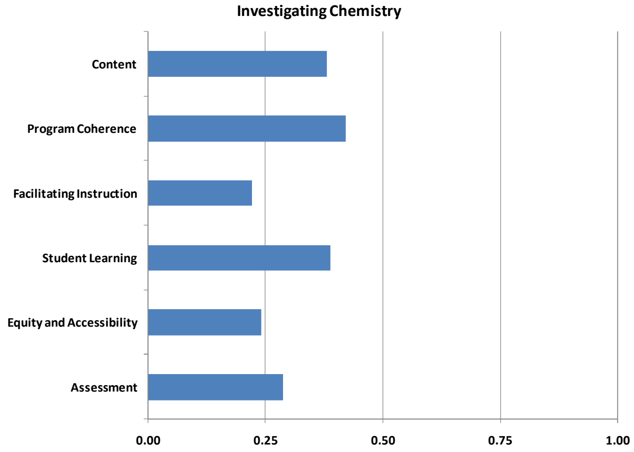
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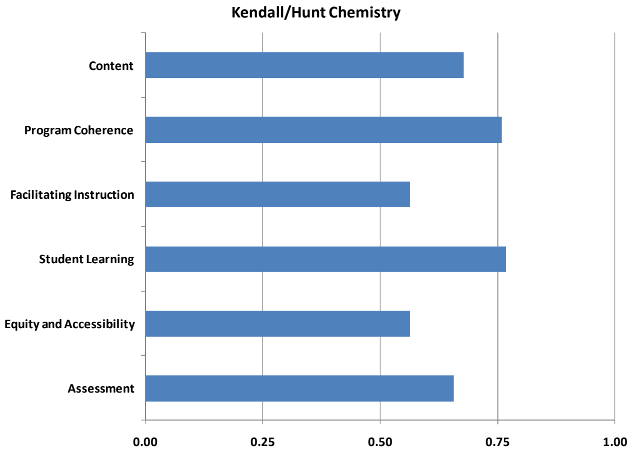
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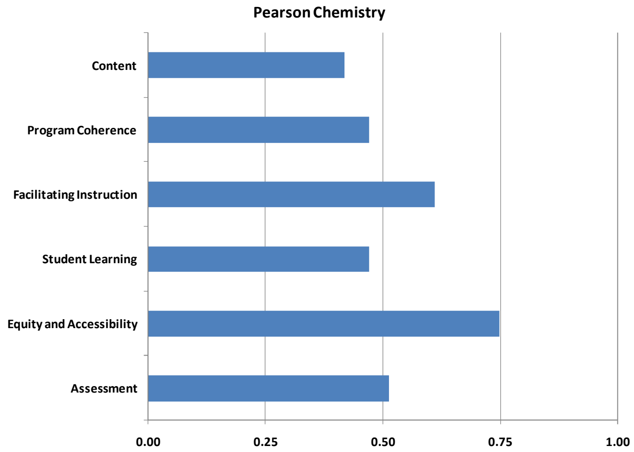
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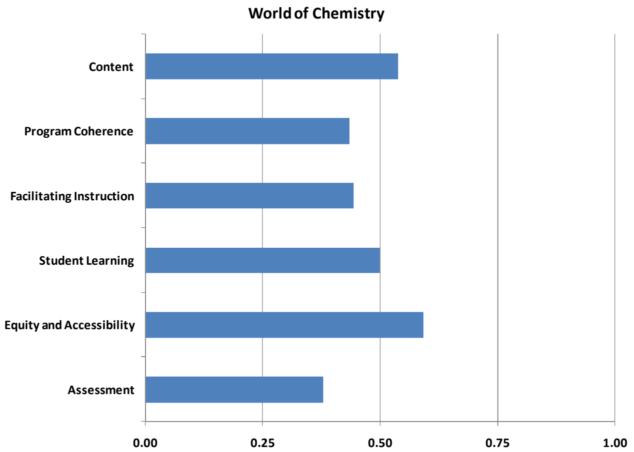
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Student Learning
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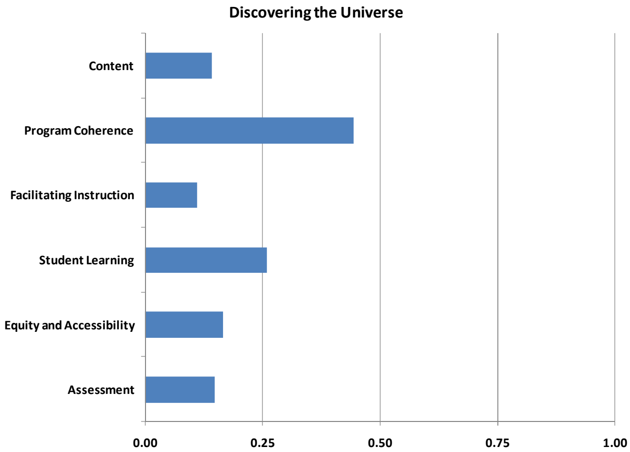
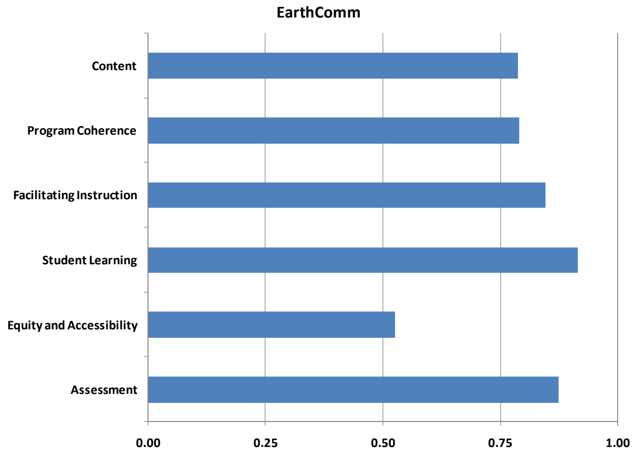
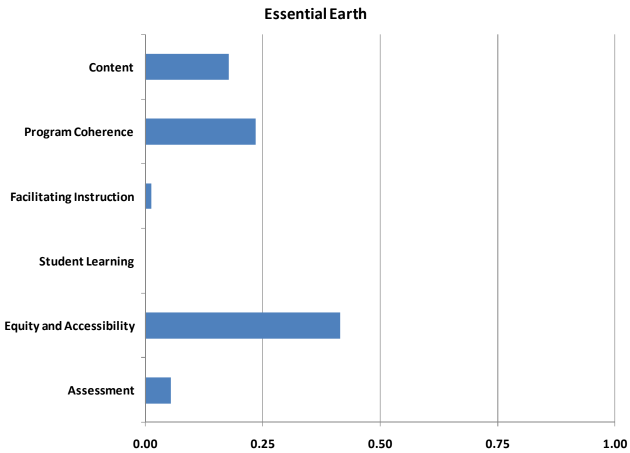
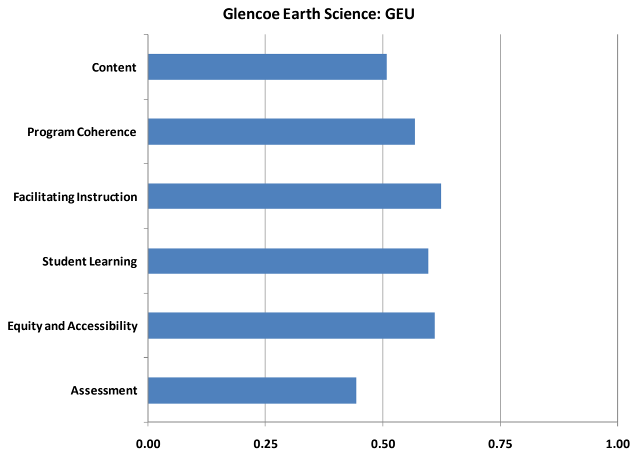
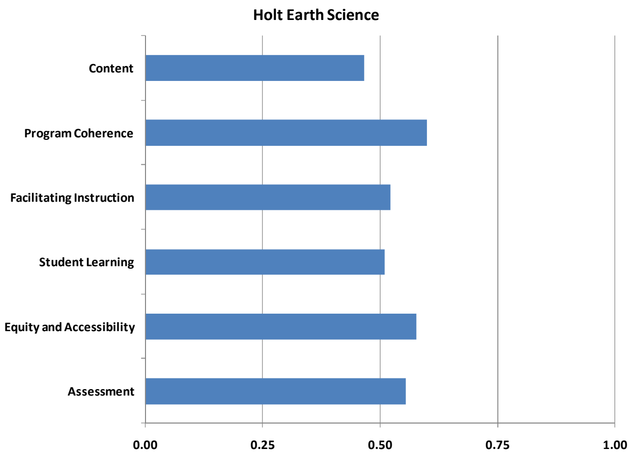
3.3.3.3 Earth Science

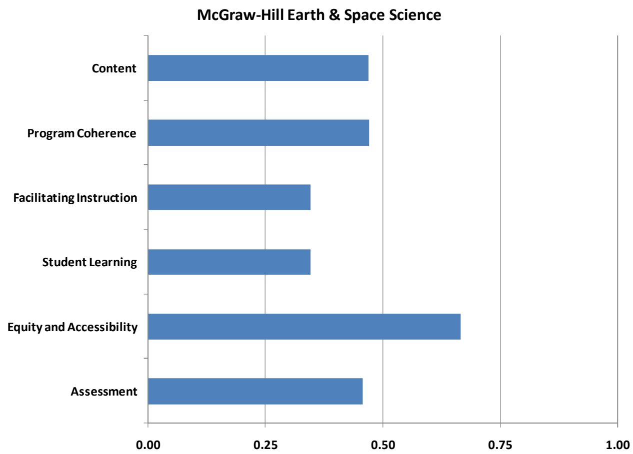


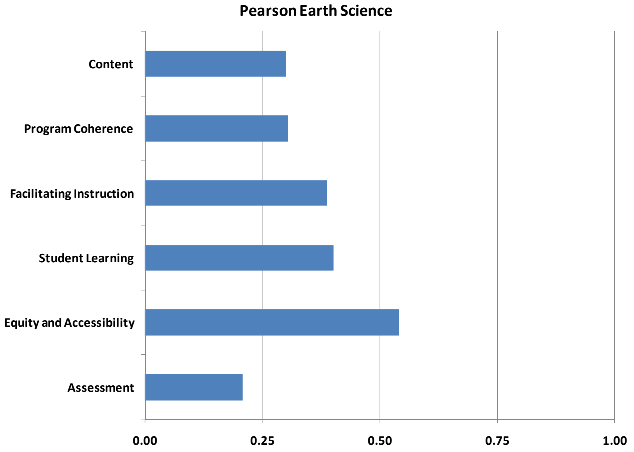


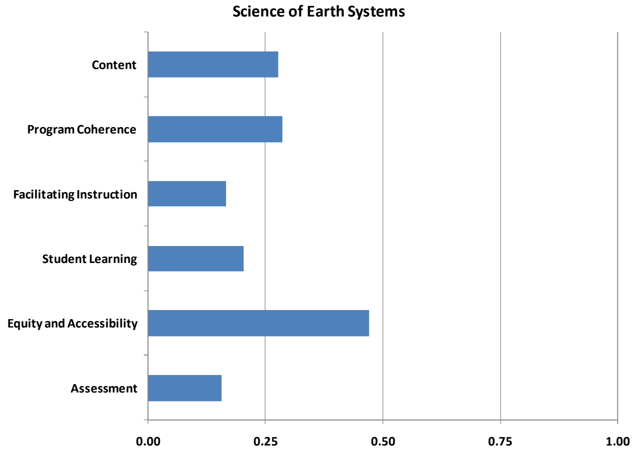




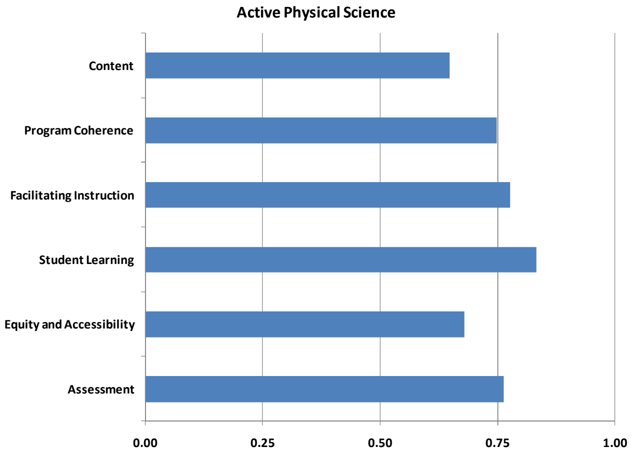


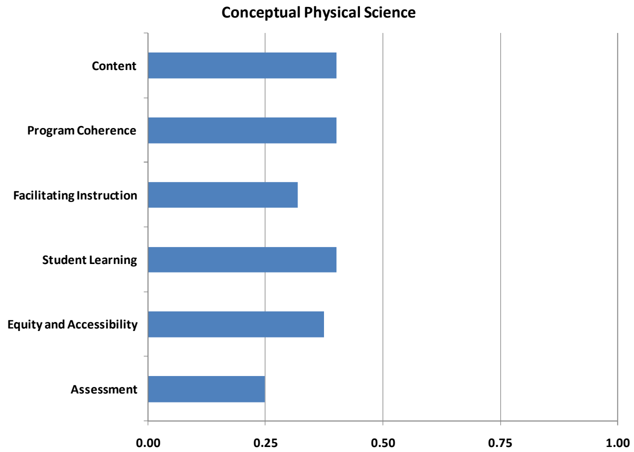


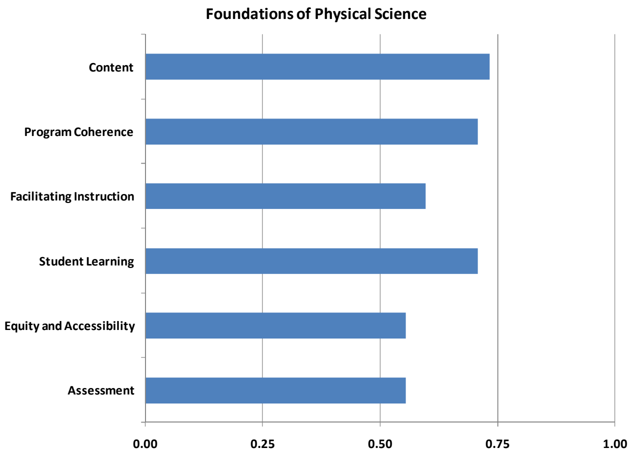


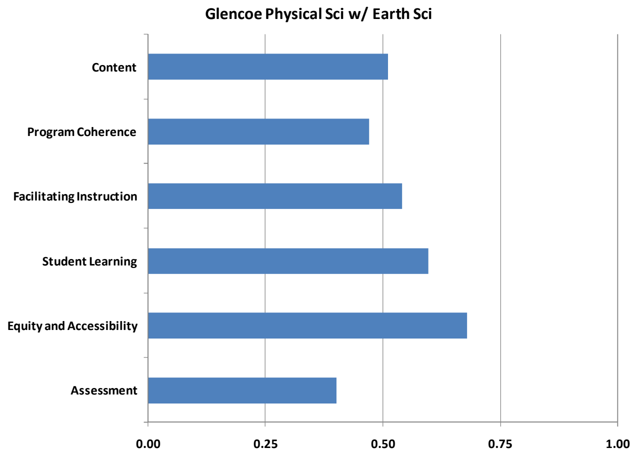


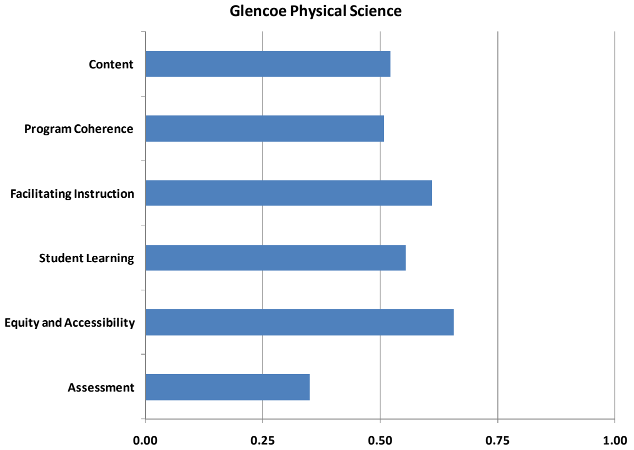
3.3.3.4 Physical Science







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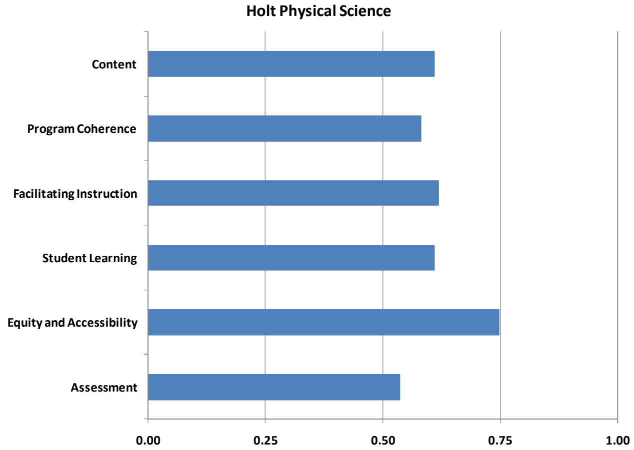
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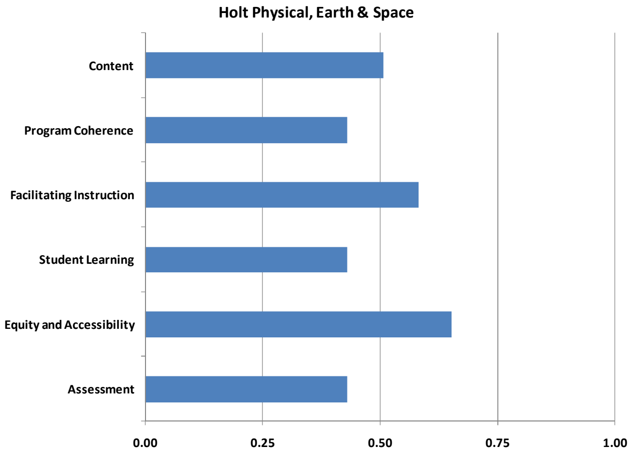
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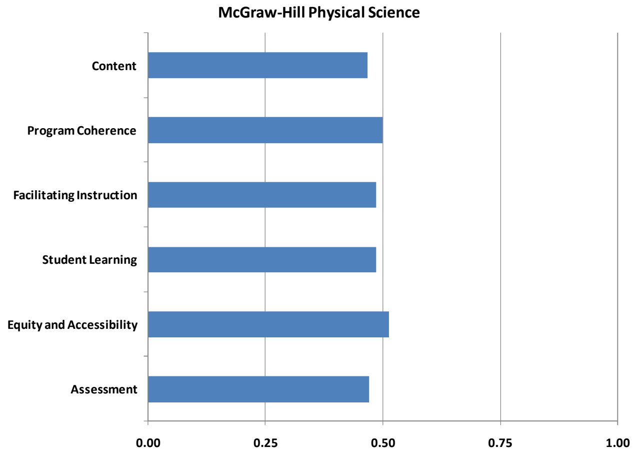
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Student Learning
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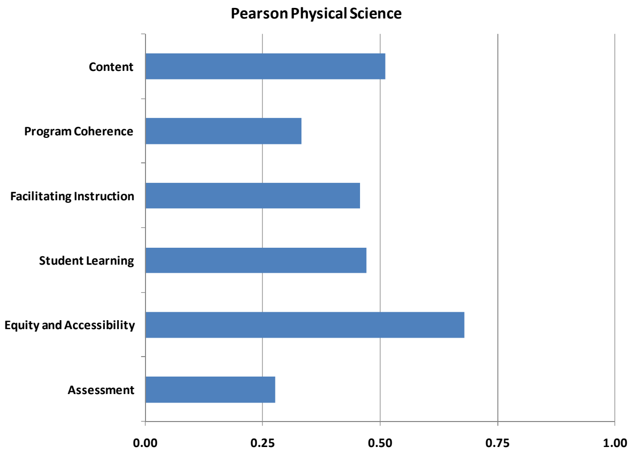
Pearson Physical Science
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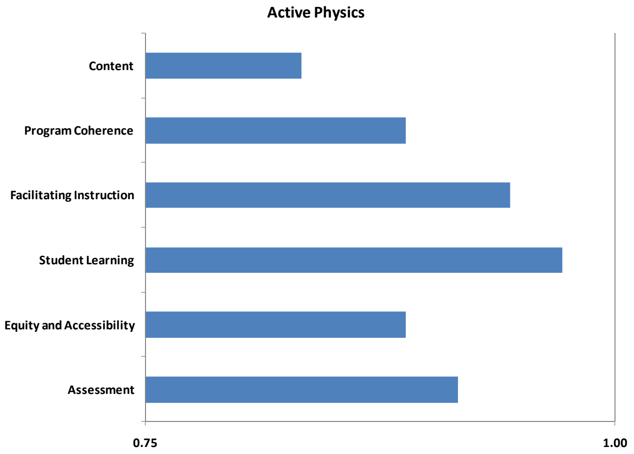
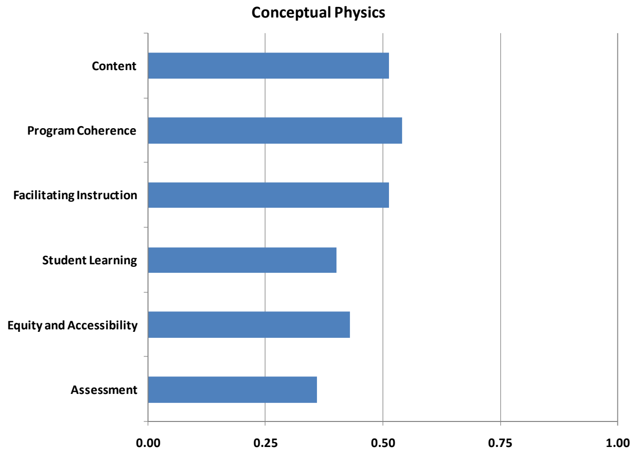
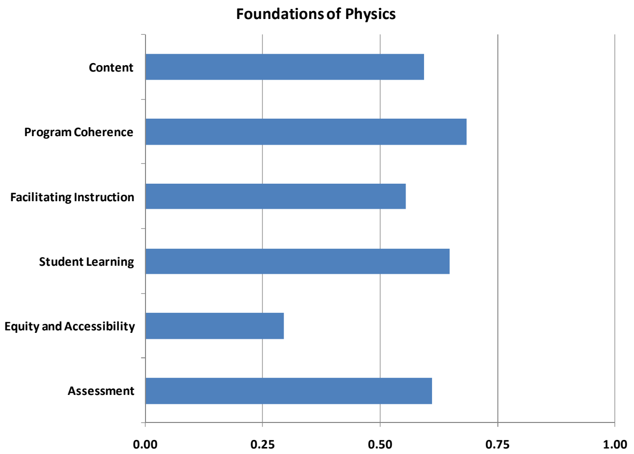
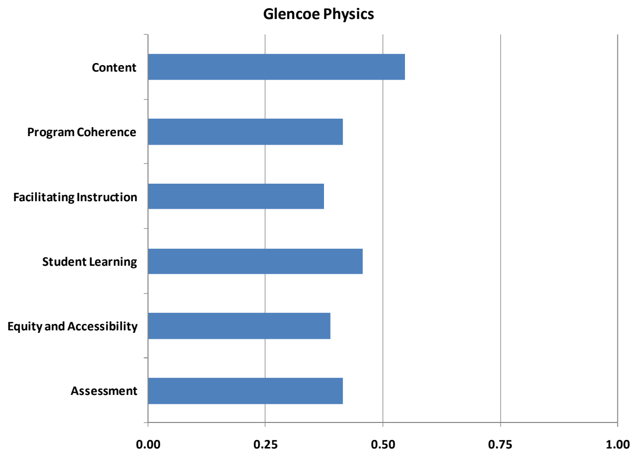
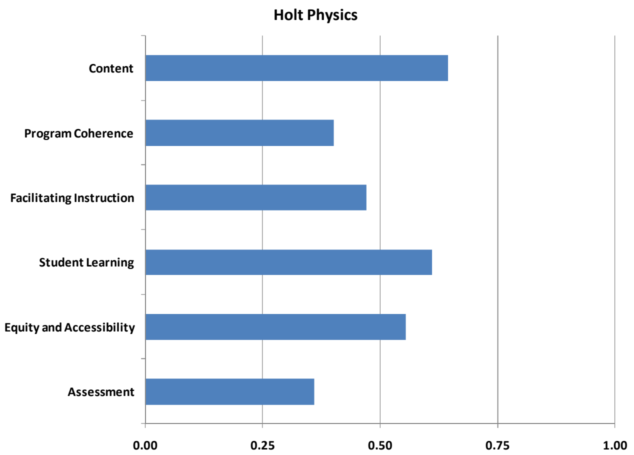
3.3.3.5 Physics

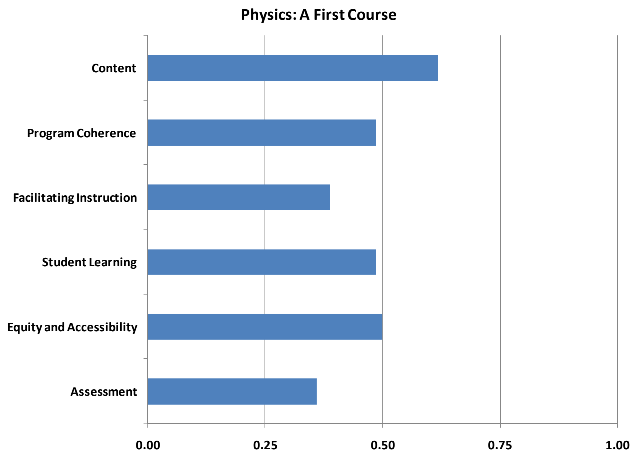












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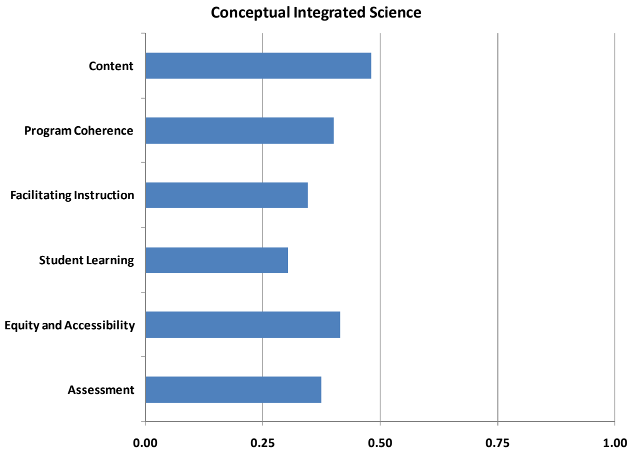

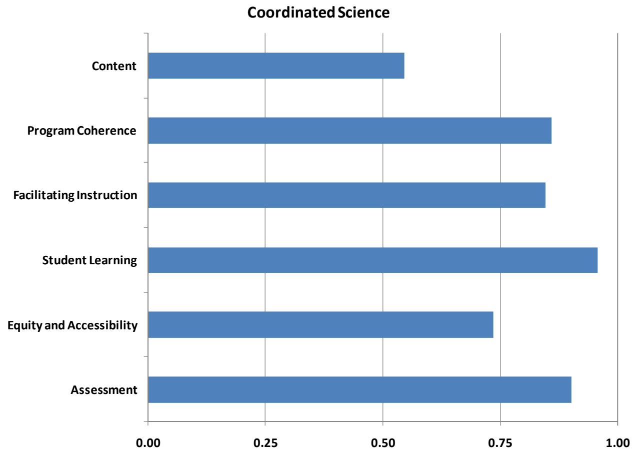

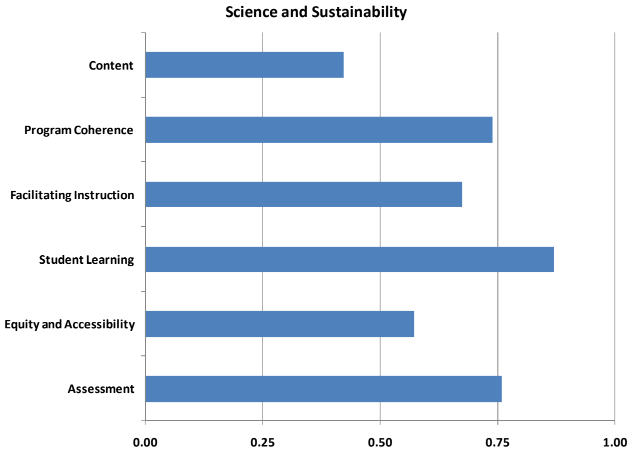

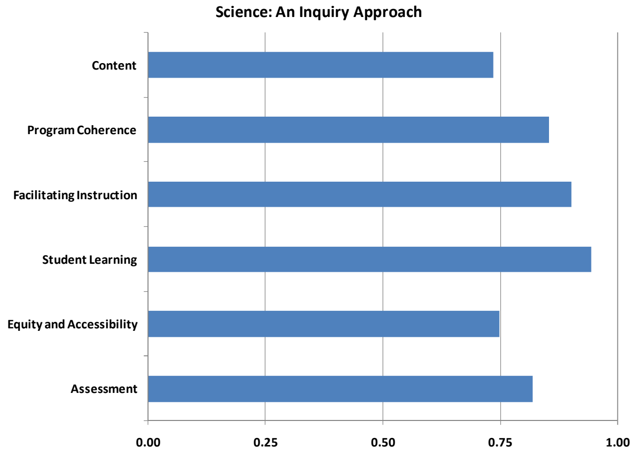

4 Conceptual Development Review Results

This section includes narrative evaluations of many of the top-ranked programs. Eight university scientists reviewed the conceptual development of the Big Ideas in Science as found in the revised Washington State K-12 Science Standards. They received the following guidance in framing their work.

Please note that all comments in this section represent the individual opinion of the author and not official positions by OSPI.

- All materials are to be evaluated for development of the three crosscutting ideas and the domain area(s) that best fit the Big Ideas within domain and grade band you have been assigned.
- The research base for your work is only to be the Revised Washington State Standards, and the research base for those standards: "*How People Learn*" and "*Ready, Set, Science*".
- Materials are to be evaluated holistically, as to their strengths and weaknesses in conceptual development.
- You may use the suggested framing questions as a starting point for your review but we have asked you to do this work based on your high levels of expertise in the educational sciences and as such would like your individual evaluation of the materials.
- Overall question for evaluation: To what extent does the instructional material provide the student the opportunity to develop deep conceptual understanding of the concepts found in the Big Ideas?
- Possible "look for's" when evaluating science instructional materials for conceptual development[9]:
  - Do the materials convey the purpose of each unit and lesson providing an overall sense of purpose and the relationship of one lesson or unit to another?
  - Does the material involve students in a logical or strategic sequence of activities (verses just a collection of activities)?
  - Does the material provide multiple and varied phenomena to support the conceptual learning of the Big Idea?
  - Does the material develop an evidence-based argument for the Big Idea?
  - Does the material provide a logical sequence of encounters with the Big Idea and tie them together?
  - Do the materials explicitly draw attention to appropriate conceptual connections?
  - Do materials include assessments tasks that require application of the concept developed in the Big Ideas?
  - Do formative assessments that are imbedded in materials support the sequential development of student conceptual understanding while informing instruction?
  - Does the material focus on the development of a limited number of fundamental concepts?

[9] Resource paraphrased to fit the parameters of this review. *AAAS Project for 2061: Criteria for Evaluating the Quality of Instructional Support.*

- Is historical development of concepts present, including evidence for “the way that knowledge was arrived at?
- Does the material revisit and summarize and provide closure to the intended learning concepts?

4.1 Elementary

<table>
<tr><td>Publisher: Delta Education</td><td>Program Name: FOSS</td></tr>
<tr><td>Reviewer: Anne Kennedy</td><td>Grade Level/Course: In depth Landforms: Grade 5-6; insect and plants 1-2; dipstick into other materials</td></tr>
<tr><td>Strengths:
Concepts are based on the National Science Education Standards (NSES) and support WA Standards
Each investigation has background info on students understanding of the concepts/content
Factual knowledge is integrated into an overarching conceptual framework
Sequencing of the unit is very likely to lead to students understanding of the big idea
Students explore phenomena related to concepts in multiple and varied ways (investigation, reading, writing, discussing)
Assessments are ongoing and linked to big ideas
Students are asked to apply their understanding in real world context
Concepts are built over time
Systematic observation is strongly developed
Materials support three key findings from HPL and address important features of Ready, Set, Science</td><td>Weaknesses:
Units with strong conceptual development are not always in alignment with big ideas in WA Standards (but they are aligned with NSES)
More emphasis is needed on having students’ connect claims, evidence, and reasoning.
More emphasis needs to be given to having students make their thinking visible to others through sharing and defending ideas.
More emphasis needs to be given to students’ generalizing learning in their own words [e.g. what is the role of modeling in answering scientific questions]
Importance of repeated trials is implied but not explicit [e.g. landforms unit when students are controlling variables in streamtable investigations]</td></tr>
<tr><td colspan="2">Summary of Findings:
A key feature of elementary science as described in both <u>Ready, Set, Science</u>, and <u>How Students Learn</u> is that students develop scientific understanding through observing scientific phenomena related to the question or idea being studied, generate and evaluate evidence through</td></tr>
</table>

experimentation, use reasoning skills to construct explanations, and reflect on knowledge gained in terms of its relationship to the big ideas of science. Students are expected to use facts to support their conclusions, represent ideas orally and in writing, and defend their ideas based on evidence. This view of science foregrounds students doing and learning science in an integrated way.

These materials are designed to develop students' understanding of science concepts and principles through active engagement in a series of investigations. Students' conduct experiments, make observations, record data, and build explanations supported by evidence derived from their investigations. Class discussions and readings contribute to the learning by reinforcing vocabulary, identifying knowledge acquired in the activities, introducing specific scientific terminology, and generalizing findings related to concept being developed. Readings also enhance and extend learning beyond the classroom.

The investigations (usually 4 or 5, each with sub-parts) are sequenced to support the development of sub-concepts which are related to an overarching idea that spans the entire unit. Concepts take into consideration students' prior knowledge and abilities concepts and ideas are repeatedly reinforced in different ways. Language and literacy development are supported by the use of science notebooks, and public word banks and inquiry/content charts. An assessment system is described that is both embedded (formative) and summative. Assessments address the development of content knowledge, conducting investigations, and building explanations. These assessments are strongly connected the big idea of the unit.

These materials provide multiple and varied opportunities for students talk about and discuss their ideas related to the concepts to be developed. Early investigations focus on having students explore phenomena that connect to their everyday life and encourage students to explain or show their understanding related to the phenomena. Subsequent investigations provide opportunities to build knowledge through guided explorations that support students' abilities to do and understandings of inquiry. During class discussions students are asked to talk about what they have learned (facts) and begin to make generalization (concepts). Later investigations provide opportunities to connect what they have learned previously, apply this learning, and demonstrate understanding on a final summative assessment. These assessments are sometimes performance based, and require students to explain their thinking orally and in writing.

In terms of content coverage, these materials tend to explore a limited number of scientific concepts and principals in depth. A unit is typically 8-10 weeks in length. A limitation of the materials is that because of this depth, it is critical that the units are in good alignment with state standards. Units need to be carefully sequenced to address systems, inquiry, application and the domains for each grade level to ensure students have opportunities to develop understandings across and within standards.

Assessment strategies in the unit include teacher observation, student notebook sheets, and a summative assessment (which includes an interview, drawings, and writing). Students are asked similar questions over all investigations [structures or parts, needs, life cycle]. These get at the big ideas of what do plants and animals need, how do they grow and change (focus on structure and function) and what is their life cycle. Other ideas about environments, variation, and inherited traits are introduced but not developed.

Explicit treatment of inquiry and application (WA Standards). Major emphasis on developing

students conceptual understanding of models, investigations. Units are designed to take place over. 6-8 weeks (2-3 sessions per week). Concept development foregrounds the use of models to understand features of the earth, the earth science content of the unit only hits on a portion of the big idea for developing earth systems, structures and processes (formation of earth materials) *Evidence of Strong Sequencing and Conceptual Development* The lessons include several staging activities to determine what students know about the big ideas [e.g. what are models] and these are revisited over time [models/maps, streamtables, mountains, etc]. Background knowledge is built through guided inquiries that build sub-concepts [e.g. erosion and deposition, purpose and use of models, rates of erosion], readings, and class discussions related to specific ideas over time]. Content and inquiry charts are used as public records that summarize knowledge acquired in activities, develop vocabulary, and connect ideas. Students build models and conduct investigations that ask them to compare results of controlled experiments across groups, compare activities to real life examples or vice versa, and look at phenomena from multiple perspectives [building a map of the school yard, and looking at landforms from aerial photographs'. Students look for evidence and build explanations based on their findings . Students discuss their understanding and share findings as a whole group. There are many opportunities for students to share their thinking along the way. As a culminating activity for the unit teams of students design and develop an investigation of their own. They are expected to share their work at a student lead science conference. While the Landforms Unit does a good job helping kids understand how models [2 dimensional and topographic maps, & streamtables] can be used to represent and discover how features of the earth came to be, there are no generalizations made about the role of modeling in answering scientific questions.

Publisher: Macmillan / McGraw-Hill	**Program Name**: Science: A Closer Look
Reviewer: Anne Kennedy	**Grade Level/Course**: Earth Science Grade 4 – especially chapter 8 – the solar system and beyond / Earth and Life Science Grade 3 / summary review of K-5
Strengths: • Uses a learning cycle of engage, explore, explain, evaluate, and extend • Units and chapter topics are based on big ideas from NSES; • There is logical sequence between activities	Weaknesses: • Pieces of concepts are found at different grade levels and are not fully developed within a unit or chapter • The material focuses on a number of ideas without depth of treatment related to the big idea (e.g. day and night, seasons, phases of the moon, classification, needs of living things)

• Provides opportunities for students to consider what they have learned over time
• Uses students prior knowledge of topics to guide activities
• Purposes of activities are clear
• Uses graphic organizers to help students organize their learning
• Strong integration of language development through discussion
• Labs provide opportunities for structured, guided and open inquiries
• Labs support students development of aspects of inquiry skills
	• Lots of extraneous information not related to the big ideas
	• Concept development relies heavily on students abilities to read, interpret, and integrate factual information, labs are used to support ideas in the reading but not to help students build theories or concepts (this would demonstrated by multiple activities related to the same concept)
	  o Causes of day/night, seasons and/or phases of the moon
	  o Needs of plants/animals
	  o Purpose of classification
	• Activities and discussions focus on lower levels of Bloom's taxonomy (knowledge and comprehension) and not on students ideas about scientific phenomena
	• Too much information and not enough opportunities for student to integrate learning or demonstrate their understanding of big ideas (orally, in writing, or with others)
	• Students are expected to understand ideas that are inappropriate for their grade level (photosynthesis, earth/sun/moon relationships, etc)
	• Students have few opportunities to connect evidence and explanation; especially with regard to the big ideas within and across the chapter

Summary of findings: A key feature of elementary science as described in both Ready, Set, Science, and How Students Learn is that students develop scientific understanding through observing scientific phenomena related to the question or idea being studied, generate and evaluate evidence through experimentation, use reasoning skills to construct explanations, and reflect on knowledge gained in terms of their relationship to the big ideas of science. Students are expected to use facts to support their conclusions, represent ideas orally and in writing, and defend their ideas based on evidence. This view of science foregrounds students doing and learning science in an integrated way. The focus of these materials is on learning science concepts through knowing the facts that support those ideas, and doing related inquiries that illustrate some aspect of content being studied. Science content and inquiry are treated as separate but complimentary activities. These materials foreground science as a collection of facts and theories, and backgrounds science as a way of building new knowledge based on observation, reasoning, and experimentation. These materials provide opportunities for students talk about and discuss their ideas related	

to the concepts to be developed, but the activities themselves rely heavily on knowledge presented to the students and not on students developing their own ideas about how the world works. This is evidenced by the work students are doing within each unit and in the close of activities and lessons reviews. Questions and demonstrations focus on main ideas presented in the readings (and activities), review of important vocabulary, and answering questions that are related to content in the chapter instead of probing for students ideas around the concepts developed across units, chapters, or lessons.

In terms of learning content through actively engaging in the processes of scientific inquiry, and using this data to make connections to the overarching concepts, there was little evidence to support this. Students do conduct investigations, make observations, and develop explanations related to the content, but these activities are largely confirmatory in nature and do not provide for multiple and varied opportunities to investigate phenomena that support an understanding of the big idea. Further, these experiences do not allow students to situate or connect their learning (knowledge generated) within the larger framework overarching goals for the lesson, chapter, unit or across grade levels and years. It was not clear from the materials how individual activities would support students' conceptual development or understanding.

Finally, these materials cover a great deal of content (and concepts) in a short amount of time. The two units I covered in depth (one fourth of the year long curriculum) introduced students at the third grade to structures of plants and animals, the functions of structures in plants and animals, the classification of plants and animals, the life cycles of plants and animals, and inherited and learned traits of animals. In a fifth grade unit on planets, moons, and stars, students learned about rotation, revolution, seasons, phases of the moon, the movement of planets in the solar system, and appearance of constellations during different seasons. In both of these examples, content covered for conceptual understanding could easily span an entire year. As I looked across the curriculum it appeared that there was coherence across the grades, but that treatment of the big ideas was wide in scope and shallow in depth.

Materials use an instructional design of engage, explore, explain, evaluate, extend – this learning cycle appears to cross over several concepts and does not fully develop one concept at a time:

This is the first 2 day sequence:
Engage – Assess prior knowledge: causes of day and night; movement of earth in space/ discuss movement of sun across the sky – why does it move from east to west?
Explore – use globe/flashlight to model day and night
Explain – students read about causes for day and night; new ideas on apparent motion and shadows are introduced but not developed; students look at diagrams
Explain – new ideas on seasons are introduced but not developed; students look at diagrams; indirect light is introduced
Evaluate – on level assessment is draw a picture and label a diagram
Extend – write a story about earth without the sun

Overall impression – these materials are not appropriate for the cognitive development of 4th graders. Research suggests that students understanding of seasons and phases of the moon is appropriate for middle school. Effective instruction of these topics might take several weeks.

There is no concept development in these materials. The treatment of concepts here is superficial – students have few opportunities to explore ideas in any depth and to connect learning to what they know and observe. For instance, the materials never connect "what causes day and night" to the idea that objects move in predictable ways such as observing and collecting data the apparent motion of the sun from first hand observation. Students are given information about rotation, apparent motion, and shadows, seasons, etc.

- Teachers are asked to assess prior knowledge and then give students the correct answers
    - There is no information on students misconceptions or research on students ideas about day and night, seasons [though this may be in the pd modules]
- Activities are confirmation labs that have students model one example day / night, angle of the sun (to explain seasons).
- Materials rely heavily on reading and diagrams
- No references are made to having students explain their thinking
- Students do not discuss their ideas with each other – using evidence and reasoning
- Activities do not connect to students actual experience
- Labs assumes prior knowledge
- Assessments at level are at a low cognitive demand

Publisher: Chicago Science Group	**Program Name**: Science Companion
Reviewer: Anne Kennedy	**Grade Level/Course**: Earth's changing surface (levels 4-6); grades 2-3 life cycles; dipstick of others
Strengths: • Strong emphasis on development of students conceptual understanding as defined by NSES and Benchmarks • Sequencing of the unit is very likely to lead to students understanding big ideas • Concepts are built over time • Some aspects of the inquiry standards are strongly developed (e.g. work collaboratively; gather, record, and organize data; create models; explain how model is similar to…) • Facts are used to support conceptual understanding • Students explore phenomena related to concepts in multiple and varied ways (investigation, reading, writing, discussing) • Students are asked to apply their understanding in real world context	Weaknesses: • Units with strong conceptual development are not always in complete alignment with big ideas in WA Standards (but they are aligned with NSES and Benchmarks) • More emphasis is needed on having students' connect claims, evidence, and reasoning. • More emphasis needs to be given to having students make their thinking visible to others through sharing and defending ideas. • Discussions are primarily teacher directed and students are not explicitly negotiating ideas with one another • Some materials are very complex and development of big ideas is dependent on teachers understanding of how various clusters are supported and

• Assessments are tied to the big ideas. There is frequent and ongoing assessment related to cross-cutting concepts and abilities and individual domains • Materials support three key findings from HPL and address important features of Ready, Set, Science	developed over time. • Some activities or lessons are tangential to development of the big ideas and can be confusing

Summary of Findings:

A key feature of elementary science as described in both *Ready, Set, Science*, and *How Students Learn* is that students develop scientific understanding through observing scientific phenomena related to the question or idea being studied, generate and evaluate evidence through experimentation, use reasoning skills to construct explanations, and reflect on knowledge gained in terms of its relationship to the big ideas of science. Students are expected to use facts to support their conclusions, represent ideas orally and in writing, and defend their ideas based on evidence. This view of science foregrounds students doing and learning science in an integrated way.

Materials use NSES/Benchmarks as a starting place for curriculum development and materials. Units are designed to support students' development of science concepts and principles through active engagement in activities and investigations that address important sub-concepts identified in the unit summary. Guided inquiries require students to make observations, record data, predict outcomes, summarize findings, and connect ideas across lessons. Class discussions contribute to the learning by introducing and reinforcing vocabulary, identifying knowledge acquired in the activities, and summarizing ideas related to concept being developed.

Lessons are "clustered" to support the development of sub-concepts which are related to an overarching idea that spans the entire unit. Activities build on students' everyday understanding of phenomena and encourage students to connect what they know to what they are learning. Students use science notebooks to document ongoing investigations and to record how their ideas have changed over time. Students use factual information they learned directly from activities and investigations to support their explanations of big ideas like life cycles and changes to the earth's surface due to specific environmental factors. Concepts and ideas are reinforced over time and in different ways. Vocabulary is introduced and developed in the context of each lesson, though explicit instruction in this area is not emphasized.

Assessments are tightly linked to each concept and sub-concept within and across lessons. Teachers use assessment logs to document observed changes in students understanding of concepts related to the domain of science under investigation, as well as to students' abilities to do inquiry. A weakness of these materials is that assessment is largely the responsibility of the teacher, and students are given few opportunities to self assess their own understanding of concepts or consult with peers on the reasonableness of explanations or appropriateness of investigation design and/or implementation.

Instruction relies heavily on class discussions where students talk about and discuss their ideas related activities. Most lessons begin with a discussion designed to determine what students know or think about the content of the lesson. Background knowledge is then built through teacher directed activities, readings, and individual exploration [there is a classroom based science center where students explore ideas they are interested in on their own]. Ideas are further developed through investigations or explorations that encourage students to connect ideas within and across lessons. Lessons conclude with whole group reflection and students' discuss findings and teachers and students summarize key ideas. Opportunities for students to plan their own inquiries, prepare reports, present findings are found in extension or culminating activities.

In terms of content coverage, these materials tend to explore a limited number of scientific concepts and principals in depth. A unit is typically 10-13 weeks in length. A limitation of the materials is that because of this depth, it is critical that the units are in good alignment with state standards. Units need to be carefully sequenced to address systems, inquiry, application and the domains for each grade level to ensure students have opportunities to develop understandings across and within standards.

Materials use NSES/Benchmarks as a starting place for curriculum development and materials strongly adhere to developing these ideas over an extended period of time. The entire unit is designed to be used over a 10 week period of time (2 sessions per week) – including extensions.

In the unit Earth's Changing Surface four big ideas were explored and developed over 13 lessons.

- Landforms are the result of changes to the earth's surface
- Moving water, ice, and wind break down rock, transport materials, and build up the earth's surface
- The earth's rock is slowly weathered or broken down into smaller fragments
- Movements of the earth's crust shape the surface of the earth

Evidence of Strong Sequencing

The lessons include several <u>staging activities</u> to determine what students know about the big ideas [e.g. what causes changes to the earth's surface] and these are revisited over time. <u>Background knowledge</u> is built through directed activities [e.g. examine and discuss photo's of landforms]; guided activities that build sub-concepts [e.g. looking at models, using streamtables, conducting simulations], readings, and individual exploration [there is a classroom based science center where students explore ideas they are interested in on their own]. Students build models and conduct <u>investigations</u> that ask them to make observations and look for evidence of how water, wind, ice cause changes to the earth's surface [how does amount of water, slope and type of sediment affect the shape of the river- lesson 5; Looking for changes – lesson 10; and Touring Landforms – lesson 13]. Students <u>discuss</u> their understanding and analyze key points frequently as a whole group. Limited opportunities for students to plan their own inquiries, prepare reports, present findings.

• Opportunities for exploring *systems* and *<u>planning</u> investigations* exist, but these are not explicitly addressed in the way WA Standards are written • Concept development foregrounds formation of structures on the earth's surface and not formation of soils in particular (this is implicit and not explicit) <u>Notes from solids, liquids and gases (level 1-3)</u> Objects and materials, properties of solids; liquids and gases; changes Lessons are sequential and tied to assessments on concepts related to properties and characteristics of solids, liquids, and gases, changes, and observing and describing. Ideas are developed over time, connected to students experiences in the world, children's investigations of materials Unit is developed similarly to others in terms of content, processes, and applications of ideas

Publisher: Scott Foresman	**Program Name**: Science: The Diamond Edition
Reviewer: Anne Kennedy	**Grade Level/Course**: Grade 4 – Earth Science Unit; Grade 2 Life Science Unit
Strengths: • There are some instances where development of conceptual understanding is referenced (for instance, creating a concept web and other graphic organizers) • The use of essential questions has the potential to bring coherency to the chapter and unit • The use of reading strategies such as cause and effect (page 181 and supporting activities in workbook) provide support for developing inquiry skills • Some assessments strategies (such as those in the workbook promote self-assessment)	**Weaknesses**: • Learning is organized around topics, not concepts • Connections to big ideas are made for students • Not sure what the concepts were, there is a lot about what happens or what is, but not a lot of development and exploration of the underlying scientific principles • Activities and readings are connected to students prior knowledge is surfaced related to topics, but this information is not used over time to determine if students ideas related to concepts has changed • Instructional materials provide a great deal of factual information, but there are few opportunities for students to connect scientific ideas across the chapter or the unit into any overarching conceptual framework • Students explore science content

	primarily through vocabulary development and reading, with some discussion and investigation (though there is some good inquiry in the reading activities) • Teachers lead investigations and discussion • Learning opportunities provide limited entry points for learners with different backgrounds / knowledge in science

Summary of findings:
A key feature of elementary science as described in both *Ready, Set, Science*, and *How Students Learn* is that students develop scientific understanding through observing scientific phenomena related to the question or idea being studied, generate and evaluate evidence through experimentation, use reasoning skills to construct explanations, and reflect on knowledge gained in terms of their relationship to the big ideas of science. Students are expected to use facts to support their conclusions, represent ideas orally and in writing, and defend their ideas based on evidence. This view of science foregrounds students doing and learning science in an integrated way.

The focus of these materials is on knowing scientific content and understanding scientific explanations through reading about them, and learning about the scientific method by conducting labs related to the readings. Science topics and inquiry are treated as separate but complimentary activities. These materials foregrounds science as a collection of facts and theories, and backgrounds science as a way of building new knowledge.

Students have few first hand experiences with the phenomena they are studying. Labs are presented at the beginning and end of the chapter and unit and are designed to reinforce one aspect of information presented in the readings, or they may help support one or more of the abilities needed to do science. While there is strong support for some skill development such as predicting, comparing, gathering and organizing information from readings (and some labs), and oral presentations, these activities are treated discretely and not in the service of helping student to develop explanations related to the big ideas.

The materials provide few opportunities for teachers to understand and build on students' current knowledge & beliefs about scientific phenomena or their ability to reason. Students are asked to state what they know about a given topic at the beginning of a chapter, but this information is not often related to the concept, and not used to guide instruction or to help teachers or students compare (over time) their thinking to our current understanding of scientific principles and concepts.

In terms of learning content through actively engaging in the process of scientific inquiry, and linking facts to larger conceptual ideas, I could find little evidence to support this. Students had few opportunities to conduct investigations, make observations, or develop explanations related to key

concepts. Because of this, students were not able to look for and find patterns or make claims about what they observed related to the key questions, they could not build theories or construct mental models based on their learning across activities or the unit, and they are given few opportunities to compare their findings with others. Student learning for these materials is dependent on an individual students' ability to make meaning from the readings, and while there are a lot of good strategies in related resources – the activities laid out in the teachers guide and student text are designed for content coverage and not conceptual development. These instructional materials provide many opportunities for students to build vocabulary, build a repertoire of facts and information related to specific topics in science, and practice specific inquiry skills. One indicator about what the materials feel are important is the intervention and remediation sections. These focus on students understanding of factual information and not the overarching concepts.

Publisher: Carolina Biological Supply	**Program Name**: Science and Technology for Children
Reviewer: Anne Kennedy	**Grade Level/Course**: Land and Water – Grades 4-5
Strengths: • Strong emphasis on development of students conceptual understanding as defined by NSES • Sequencing in unit is very likely to lead to students understanding big ideas • Concepts are built over time • Facts are presented within a conceptual framework • Students explore phenomena related to concepts in multiple and varied ways (investigation, reading, writing, discussing) • Students are asked to apply their understanding in a real world contexts • Materials support three key findings from HPL and address important features of Ready, Set, Science • Culminating activities provides students opportunities to demonstrate learning related to the big ideas of the unit	Weaknesses: • Units with strong conceptual development are not always in alignment with big ideas in WA Standards (but they are aligned with NSES) • More support could be given to anticipating learning progressions, pre-conceptions, or misconceptions • While there is evidence of strong assessment in terms of inquiry, greater attention needs to be given to assessing student understanding of specific domain content • Discussions are primarily teachers directed and students are not explicitly sharing and negotiating ideas with one another • Many opportunities exist for students to construct and develop explanations (through classroom discussions and in science notebooks), but more emphasis

	is needed on the links between claims, evidence and reasoning • More emphasis needs to be given to students' generalizing learning in their own words [e.g. what is the role of modeling in answering scientific questions]

Summary of Findings:
A key feature of elementary science as described in both Ready, Set, Science, and How Students Learn is that students develop scientific understanding through observing scientific phenomena related to the question or idea being studied, generate and evaluate evidence through experimentation, use reasoning skills to construct explanations, and reflect on knowledge gained in terms of its relationship to the big ideas of science. Students are expected to use facts to support their conclusions, represent ideas orally and in writing, and defend their ideas based on evidence. This view of science foregrounds students doing and learning science in an integrated way.

The focus of these materials is on building an understanding of scientific concepts and principles through students' personal and collective exploration of scientific phenomena. Science content, inquiry, and application are interwoven as students conduct experiments, make careful observations, record and interpret data, read related resource materials, and reflect on their learning orally, and in writing (including drawings). These materials foreground science as a way of building knowledge based on experimentation, careful observation and data collection, analysis, and reflection. Opportunities for developing an understanding of the big ideas of technological design were also strongly supported in select units.

STC materials use the NSES as a starting place for curriculum development. Units describe a set of carefully sequenced lessons linked by specific sub-concepts that are clearly outlined in the unit overview. Modules follow a *concept storyline* and there is strong evidence of adherence to this storyline in the actual work students do within each of the lessons. Lessons take into consideration students' prior knowledge and skills and direct teachers to assess these regularly, especially in terms of the development of abilities to do inquiry and understanding and using scientific vocabulary. Language and literacy development are also supported through the use of science notebooks, related readings, explicit attention to vocabulary development, and frequent opportunities for students to discuss lesson components and summarize learning.

These materials are highly scaffolded with multiple and varied opportunities for students to refine inquiry skills, build a strong knowledge base, and develop and share ideas related to concepts under development. Investigations focus on students' exploration of phenomena that connect to their everyday life and the larger world around them. Class discussions focus on how data was collected and what was learned. Lessons build on one another, and provide opportunities to connect what they have learned previously, apply this learning, and demonstrate understanding by asking and answering questions related to the big ideas embedded in the unit.

Greater attention needs to be given to linking students use of claims, evidence, and reasoning.

Lessons could go further in supporting students' abilities to reflect on the knowledge they have gained, and in engaging students in discussions related to their data, their questions, and emerging ideas. Students are encouraged to develop investigations based on their own questions, and these should be leveraged to support a greater variety of self and peer assessment opportunities related to the development of understandings of the big ideas in science.

In terms of content coverage, these materials tend to explore a limited number of scientific concepts and principals in depth. A unit is several weeks in length. A limitation of the materials is that because of this depth, it is critical that the units are in good alignment with state standards. Units need to be carefully reviewed and placed at appropriate grade levels if they are to address systems, inquiry, application and the domains for each grade level to ensure students have opportunities to develop understandings across and within standards.

Notes on Plant Growth and Development

Module is developed with the NSES standards for content and science in personal and social perspectives as a starting point. Unifying concepts, unit concepts, and grade-level concepts are identified. Emphasis on what plants need and life cycles.

Lesson structure and teaching strategies emphasize the focus, explore, reflect, and apply learning cycle. Concept development is supported by investigations, class discussions, brainstorming, cooperative learning, graphic organizers, and learning centers. Assessments include a pre/post test, embedded assessments, final assessments, student self-assessment.

There are 17 lessons in this unit that support 4 subconcepts including:

1. organisms go through distinct stages as part of the process known as the life cycle
2. living things are interdependent: for example, plants depend on bees for pollination
3. Models can be used to identify the structures, functions, and behaviors of living organisms
4. Records, notes, and graphs help people understand how plants move through the life cycle and what factors affect their growth and development

Evidence of strong sequencing

The lessons include <u>staging activities</u> to determine what students know about the big idea's [e.g. shat do we know about land on earth, and water on earth, how do they understand the relationship]. <u>Background knowledge</u> is built through a series of guided inquiries that involve students in constructing models, make and record observations, look for evidence and make tentative explanations in writing and through class discussions. Readings are used to support learning. While some activities build background knowledge, other <u>investigations</u> ask students to compare their findings over time [lesson 4, 10, 13] and look for growth in student's ability to predict, record data, make meaning of data, and support their conclusions. The unit provides many opportunities for students to share and <u>discuss findings</u>.

4.2 Middle School

<table>
<tr><td>Publisher: Pearson Prentice Hall</td><td>Program Name: Science Explorer</td></tr>
<tr><td>Reviewer: Craig Gabler, Ph.D.</td><td>Grade Level/Course: 6-8
(Physical, Life, Earth/Space)</td></tr>
<tr><td colspan="2">Big Ideas from WA Science Domains:
Earth History (ES3), Force and Motion (PS1), and Flow of Energy Through Ecosystems (LS2)</td></tr>
<tr><td>Strengths:
The strengths identified below represent a composite view across the modules examined. As such, not all remarks apply to each and every module.
Application EALR addressed frequently through readings in text
Abundant access to an established set of facts (HPL 2)
Real world connections present through pictures, vignettes and some of the materials used
Sequencing is standard and appropriate, and all contained in one module – increased likelihood of concept development
Development of inquiry well scaffolded and surfaces numerous times in the body of the text
Evidence of change (ES3) given extensive coverage in text but emphasis on connecting the evidence to the big idea not explicit
Environmental issues (LS2) dealt with explicitly in a variety of contexts and in depth</td><td>Weaknesses:
The weaknesses identified below represent a composite view across the modules examined. As such, not all remarks apply to each and every module.
Concept development relies primarily on acquisition of understanding from reading the text
Assessment system lacks any of the accessing prior knowledge (HPL1) or meta-cognitive pieces of HPL3
Opportunities to develop concept of systems are present but not developed
Investigations are quite short, lacking in opportunity to build understanding through any discourse
Time devoted to Flow of Energy Through Ecosystems (core content of LS2) is very short and consequently little depth is achieved
Big idea is presented in notes in teacher margin but text lacks unifying links for students</td></tr>
<tr><td colspan="2">General Comments:
This set of materials presents itself as placing a heavy reliance on the teacher telling and the students reading. Evidence of use of a current, research-based learning theory/cycle difficult to identify. The balance between facts and concepts (HPL 2) is very heavily tipped in favor of facts, as evidenced by significant number of vocabulary words used and the text feature of highlighting. The personal and social perspective (NSES) is strongly supported.

Language from Washington's domain standards, and much of Inquiry EALR, is in the materials. It is not as explicit in reference to the Application and Systems EALRs – however opportunities are present in the materials but would need to be identified as sources if those concepts are to be developed deeply.</td></tr>
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<table>
<tr><td>Publisher: Houghton Mifflin Harcourt</td><td>Program Name: McDougal Littell Sci. Modules</td></tr>
<tr><td>Reviewer: Craig Gabler, Ph.D.</td><td>Grade Level/Course: 6-8
(Physical, Life, Earth/Space)</td></tr>
<tr><td colspan="2">Big Ideas from WA Science Domains:
Earth History(ES3), Force and Motion(PS1), and Flow of Energy Through Ecosystems(LS2)</td></tr>
<tr><td>Strengths:
The strengths identified below represent a composite view across the modules examined. As such, not all remarks apply to each and every module.
• Concepts are developed over time and sequenced so as to facilitate concept development (assuming modules are used in the order listed by publisher)
• Abundant opportunities for acquisition of an established set of facts (HPL 2)
• All modules reviewed had real-world connections
• Connections to previous learnings provided in text
• Multiple forms of assessment are embedded in the materials and provide students opportunities to reflect on their thinking (HPL 3)
• Presence of an instructional learning cycle suggests opportunity for concept development
• Opportunities for exposure to our Application EALR are present, especially strong in Ecosystems module</td><td>Weaknesses:
The weaknesses identified below represent a composite view across the modules examined. As such, not all remarks apply to each and every module.
• Predominate knowledge/skill/understanding acquisition strategy is reading the text. Heavy reliance on development through that mode.
• Utilizes systems, but explicit connection to the components of our EALR not clearly evident
• Development of concepts such as vectors addressed too early
• Investigations are quite short, lacking in opportunity to build understanding through any discourse
• Models are mentioned as tools for doing science, but lack opportunity for developing understanding</td></tr>
<tr><td colspan="2">General Comments:
The reviewed materials are well correlated to the NSES and Benchmarks. The sequencing of the learning experiences is appropriate for concept development. It is evident that the materials are built from a research-based approach. The balance between facts and concepts (HPL 2) is very heavily tipped in favor of facts, as evidenced by significant number of vocabulary words used.

Washington standards language in the materials is not as explicit in reference to the Application and Systems EALRs – however opportunities are present in the materials but would need to be identified as sources if those concepts are to be developed deeply.</td></tr>
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<tr><td>Publisher: Delta Education</td><td>Program Name: FOSS</td></tr>
<tr><td>Reviewer: Craig Gabler, Ph.D.</td><td>Grade Level/Course: 6-8 Integrated
(Earth History, Force & Motion, Pop. Eco)</td></tr>
<tr><td colspan="2">Big Ideas from WA Science Domains:
Earth History(ES3), Force and Motion(PS1), and Flow of Energy Through Ecosystems(LS2)</td></tr>
<tr><td>Strengths:
The strengths identified below represent a composite view of the three kits examined. As such, not all remarks apply to each and every kit.
• Materials develop a limited the number of concepts
• Concepts are developed over time, sequenced so as to provide students multiple access points as they develop their understanding
• Concept development is scaffolded in concert with acquisition of an established set of facts (HPL 2)
• Learning opportunities come in many forms: reading, investigations, discussion and extension
• Inquiry is embedded, not only as a ‘how’ to learn but also as a ‘what’ to learn (the Inquiry EALR)
• Multiple forms of assessment are embedded in the materials and place a high emphasis on student reflection (HPL 3)
• All three kit reviewed had real-world connections, implicit and explicit
• Opportunities for exposure to our Application EALR are present
• Opportunities for addressing our Systems EALR are abundant</td><td>Weaknesses:
The weaknesses identified below represent a composite view of the three kits examined. As such, not all remarks apply to each and every kit.
• Opportunities to address our Systems EALR present but not made explicit for the student
• Students exposed to conducting investigations but the process of designing an investigation not readily evident
• Models are used in investigations but not called out as a tool for doing science
• Materials do a good job of having students work as collaborative teams and apply designs but are not explicit about the other content standards within our Application EALR</td></tr>
<tr><td colspan="2">General Comments:
The reviewed materials are well grounded in the National Stds and Benchmarks. The sequence of activities within each kit is presented in a manner that would most likely lead most kids to a deep understanding of the big ideas presented. The materials are also well grounded in the 3 key findings in How People Learn, as evidenced by the assessments, mix of fact and concept, and having students reflect upon, and use, their new understanding.

Washington standards language in the materials is not as explicit in reference to the Application and Systems EALRs – however ample opportunities are present in the materials and would only need to be illuminated as sources.</td></tr>
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Publisher: Lab-Aids	Program Name: Issues and Life Science
Reviewer: John P McNamara, Ph.D.	**Grade Level/Course**: MS Life Science
Strengths: • The EALRS 1-3 are in general covered with specific examples and lessons • Applications are consistent and important (timely, far-reaching) throughout the curricula, I think this is the major strength of this curriculum. • Real-world examples are used—health, drugs, germs—these are real life examples that most MS students can (or can be helped to) relate to. • There are included. explicit descriptions and practices of the scientific method • I like the introduction on "Studying People Scientifically' • I personally think that the vitamin story (Pellagra) is a good one to help MS students understand that good food and health are recent developments, because of scientists. • In Activity 52 (Miracle Drugs-Or Not?) I appreciate that they provide a balanced view of use of antibiotics and don't just blame animal agriculture (which I have seen other Publishers and Authors do). • The section on genetic testing and counseling is also important and timely. • They do use a variety of learning methodologies • Good use of learning and recording and assessing strategies: asking questions, looking for answers in a variety of ways (literature/online searches, laboratory experiments, recording, analyzing, reflecting, inference, presentation, discussion) • I do like the way that they frame each problem very personally. • The activities of hypothesis and theory	**Weaknesses**: • I think that Inquiry is not as well covered in this set. It is definitely there, but I would probably categorize it as 'directed inquiry' or 'scientific method'. This is by no means a fatal flaw, but the lessons seem to be more 'cut and dried' (closed ended questions mostly). • Although examples exist in various lessons (body systems, cell systems, ecosystems), the EALRS are not always specifically spelled out ("This is an example of a system output becoming a system input") but in fact, the examples are there and it would be easy for a teacher to point out or to ask "What output of system A becomes an input for system B?" for example. I have also noted this for other curricula as well. • EALR 2, INQI—It would be better if they explicitly covered ethics, or regulations, precautions in animal experiments or human subjects. I could not find any direct statements such as "Public or private research on animals must be reviewed by a committee of specialists and public for ethical considerations prior to starting the experiment"; or "It is wrong to write down something you did not see, or to not write down something you did see that did not fit your hypothesis". These may be more appropriate for higher-level classes. Examples could be provided by the teacher. • Not as completely explicit on Science Processes and Inquiry. These standards are certainly in the material, and

development, testing, rejection, refining are appropriate and consistent for this grade level. • Apparently age-appropriate depth and breadth of coverage-they cover enough topics to introduce all students to the micro and macro scales of Life Sciences. • Meets standards for 6-8 Life Sciences (Cells, Genetics, Ecology, Evolution) • I really liked the Bioengineering part—this was a very good example of the interaction of science and engineering to solve problems. Along with the "Technology and the Life Sciences", I thought this was a very good way to 'end up'—science is forward-thinking and relevant!	students will definitely practice and master them with a good teacher, but they don't come right out and write "This is what Scientists do", etc. • I think the presentation itself (wording, graphics) is not as appropriate for middle school learners. It is simple, but a little boring maybe. Again, not a fatal flaw but I might suggest future editions get more graphics and a range of presentations.

General Comments:

These curriculum and instructional materials are adequate. I have reviewed the teacher and student editions, concentrating on those areas we were asked to (the Big Questions, System, Inquiry and Application. I have also made many observations on the presentation and content, especially in human and animal Life Sciences.

I think this is a nice, simple, easy to use set of materials. I like the simplicity. The approach is good, but I might classify it as "directed inquiry", which is not bad. But perhaps other examples exist where more personal inquiry might be followed. The teachers will have to provide more open ended questions.

This is a good set of materials. I would use it if I taught these courses. I think this would be good for districts/schools/teachers that don't have a deep science background, it might 'break them in easy'.

Publisher: It's About Time	**Program Name**: Project-Based Life Science
Reviewer: John P McNamara, Ph.D.	**Grade Level/Course**: MS Life Science
Strengths: • Meets spirit and letter of EALRS 1-3 • Embedded and explicit Inquiry, Systems and Applications • Excellent introduction to "What do Scientists do? …address big challenges and big questions" • Up front and explicit on the science methodologies, purposes and people. • Real-world examples-health, animals,	**Weaknesses**: • Weaknesses are few and tend to concentrate around the higher-level thinking skills and advanced topics (EALR 1 SYS B, C, D). • Although examples exist in various lessons (body systems, cell systems, ecosystems), the EALRS are not always specifically spelled out ("This is an example of a system output becoming a

body systems • Explicit descriptions and practices of the scientific method in everyday life, not 'ivory tower' • Deep and varied learning methodologies-visual, written, hands-on, on-line as appropriate. • Excellent use of learning and recording and assessing strategies: asking questions, looking for answers in a variety of ways (literature/online searches, laboratory experiments, recording lab book, analyzing, reflecting, inference, presentation, discussion (Project Board-communication, reflection, discussion, revision, final conclusions) • Deeply embedded hypothesis and theory development, testing, rejection, refining. • Apparently age-appropriate depth and breadth of coverage-they cover enough topics to introduce all students to the micro and macro scales of Life Sciences, but also allow plenty of time to delve deeply into many of them (not 'mile-wide, inch-deep') • EALR 3, APPF-model use, I think this was quite good in learning set 1, model of an ecosystem and the various models of residence, commercial, industrial—absolutely important application, clear connect to science (real science vs. junk science, etc). There are other modeling exercised embodied as well. • I thought the inclusion of key people and how they came to study and some personal notes was excellent—science is people asking questions. • As a scientist, I particularly was impressed with the well-balanced discussions (LS 4 Do Cells grow and reproduce) on topics of changing traits, genetic engineering. Instead of hype and	system input") but in fact, the examples are there and it would be easy for a teacher to point out or to ask "What output of system A becomes an input for system B?" for example. • EALR 2, INQI—they really don't explicitly cover ethics, or regulations, precautions in animal experiments or human subjects. Again, examples are there but I could not find stated, for example: "Public or private research on animals must be reviewed by a committee of specialists and public for ethical considerations prior to starting the experiment"; or "It is wrong to write down something you did not see, or to not write down something you did see that did not fit your hypothesis". These may be in there somewhere, but in the areas that I looked where they should be I could not find them. I think these are important points, but again often left to higher-level thinking or classes. Again, teachers can easily provide further examples in the embedded investigation, reflection, discussion processes that these materials supply. • They do not explicitly define Inquiry, Systems and Applications. They are not in the Index. Although this may seem like a minor point, especially given the very good use of these processes, this reviewer thinks it is important to state "Inquiry is defined (eg, Websters, Oxford) as…. Models are…., Systems are…. • I think that helps students and teacher clarify their thoughts. In the absence of a clear definition, it is too easy for some to just react: "I don't believe in Inquiry" or the like.

bias, they presented the facts and ideas and peoples viewpoints professionally. I think if all teachers end the year on this, it will be a great thing for helping young people work to solve problems scientifically, not forgetting however, peoples thinking and feelings. • The wrap up (Back to the Big Challenge) demonstrates the rich depth of these materials—ending with the key points and major purposes of science (not memorizing the periodic table for it's own sake, etc).	

General Comments:
I find these Science instructional materials *extremely* impressive. I have reviewed the teacher and student edition, concentrating on those areas we were asked to (the Big Questions, System, Inquiry and Application). I have also made many observations on the presentation and content, especially in human and animal Life Sciences. We were not asked to use directly the Content Standards Alignment Rubric that was used in the first review, but to be consistent, I would make the assessment that in almost every case of coverage of EALR's 1, 2 and 3, these materials rate a 3.5 to 4 (most or all students would reach mastery).

The application, systems and inquiry approach are deeply embedded in the program, certainly matching the name. Setting up the learning process based around answering and asking questions is EXACTLY what scientists, research, technical experts do on a daily basis. In addition, the questions chosen (Effects of Germs, Feeding behavior of animals, Communication, etc) all demonstrate knowledge on the publisher's and authors part about serious and timely (ageless, in some instances) questions that individuals and society are addressing. These two integrated approaches about asking questions in a practical application make this set of materials extremely useful for encouraging life-long learning, appreciation of the scientific process, the importance in daily life, and importance to a wide diversity of students individually. As mentioned above, I personally and professionally thought the balanced approach to topics such as genetic engineering was excellent, and example we need to pass to our youth. I think these materials meet in a serious way the letter and spirit of the Big 3 EALRs. If I were to teach in this level and area, I would use these materials.

Publisher: Glencoe	**Program Name**: Glencoe Life Science
Reviewer: John P McNamara, Ph.D.	**Grade Level/Course**: MS Life Science
Strengths: • The "Big 3" EALRs (Systems, Inquiry, Application) are covered with appropriate depth. • The materials demonstrate embedded and very explicit Inquiry, Systems and	**Weaknesses**: • Weaknesses are few and apply to higher-level thinking skills and advanced topics (EALR 1 SYS B,C,D). • Although examples exist on systems, and they are good examples (body systems,

Applications • Real-world examples are clearly described right from the start • In the introduction to the student, there are good specific descriptions and practices of the scientific method in everyday life, I think these are very important, this curriculum comes as close to actually defining these terms as I have seen (see Weaknesses, below) • The materials show a variety of learning methodologies-visual, written, hands-on, on-line as appropriate. • Completely consistent during the materials, there is clear and excellent use of learning and recording and assessing strategies: asking questions, looking for answers in a variety of ways (literature/online searches, laboratory experiments, recording, analyzing, reflecting, inference, presentation, discussion) • During every lesson there are deeply embedded hypothesis and theory development, testing, rejection, refining. This is a major strength, students will probably go to sleep and wake up thinking about hypotheses! (a little joke to be sure, but seriously, the deep embedding and use of the scientific process is a major strength) • This curriculum supplies very age-appropriate depth and breadth of coverage. There is a huge amount of material, obviously enough for a 3 year program. Their chapter resources are age- and development appropriate. It is this reviewers finding that they cover enough topics to introduce all students to the micro and macro scales of Life Sciences, but also allow plenty of time to delve deeply into many of them (not 'mile-wide, inch-deep').	cell systems, ecosystems), the EALRS are not always specifically spelled out ("This is an example of a system output becoming a system input") but in fact, the examples are there and it would be easy for a teacher to point out or to ask "What output of system A becomes an input for system B?" for example. • EALR 2, INQI—they really don't explicitly cover ethics, or regulations, precautions in animal experiments or human subjects. Again, examples are there but I could not find stated, for example "Public or private research on animals must be reviewed by a committee of specialists and public for ethical considerations prior to starting the experiment"; or "It is wrong to write down something you did not see, or to not write down something you did see that did not fit your hypothesis". • Although there may not be some of these higher-level standards explicit in the materials, it is simple for teachers to easily provide further examples in the embedded investigation, reflection, discussion processes that these materials supply.

• They provide good assessment workbooks, including help with standardized tests. As a University Professor, I think this is a very important skill for students to master, whether they go to college later or not. Testing, like it or not, is part of life. • Both a strength and a weakness—the Critical Thinking/problem solving workbook. They have good examples and activities, that is a strength. But I get a little tired of these tables (page iv) of checkboxes of what 'skill' is in each lesson. Why don't they just have them ALL in each one, which again, is what scientists, and teachers, and managers, etc. do every day.	
General Comments: In this reviewer's opinion, these curriculum and instructional materials are the most extensive as well as impressive I have ever reviewed. As part of my charge, I have reviewed the teacher and student edition, concentrating on those areas we were asked to (the Big Questions, System, Inquiry and Application. I have looked at several but not all the materials on Chapter Resources, Inquiry, Laboratories and assessments. I have also made many observations on the presentation and content, especially in human and animal Life Sciences. It was quite impressive to see the first and last chapters directly and explicitly showing these students what 'Scientists Do". That they ask the big questions and try to solve big challenges (human health, biological research, and environmental health).	

Publisher: LAB-AIDS, Inc.	**Program Name**: Issues and Physical Science
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: MS Physical Science
Strengths: • Units connected concepts strongly one within each unit, and among the units where appropriate. Used real world examples that tied across units (e.g., plastics – materials, applications, life-cycle of products, ethics of use, characteristics of compounds and component parts) and skills such as dilution are reintroduced and used • The activities relate well to one another and are generally taken from real world	**Weaknesses**: • Though there is little summary or closure at the end of units, the larger and larger projects tie the unit's ideas together. Further, discussion on the topics has been through the unit, asking more complex questions that tie the material together. • PS3F – Waves – did not appear to be in the book, but had it's own section in the Teacher's Guide, with it's own explanation and activities.

issues that students can relate to – energy in the home, plastics in computers they use • There is continual analysis and having the student test, and actually design experiments, to grasp the Big Ideas • There is a logical sequence for each of Big Ideas, with one concept being built on another, and being tied together from one major unit to another (materials that create plastics, creating plastic, life cycle of plastic products; tie in to ethics and complexity in real world usage) • The material helps students draw their own appropriate conceptual connections, while having them see the complexities of making choices among disparate and sometimes opposing characteristics (e.g., how to pick a safe car – size, center of gravity, maneuverability) • Each task is tied to the concept and uses very different methods to discover concepts for themselves – labs, discussions, role playing, letter writing, etc. • There are only five units. Each delves deeply into the idea and looks at it from several angles. • Historical development is strongly present, and has students, when appropriate, recreate the analysis or experiment, to come to the law or concept presented for themselves. For example, they re-map out cholera deaths in London to come to the same conclusion that John Snow did about the Broad Street Pump. Then they write a letter as John Snow as to why the pump should be turned off.	• The teacher material is good, but in big, bulky notebooks that are somewhat awkward to handle.
General Comments: **EALR 1** is well covered with understanding inputs, outputs and flow. This was especially well done	

with both plastics and glass. It covers the idea of the cycle of material well, and adds in the concept of productive use as part of the cycle and then what happens after. **EALR 2** is extremely well developed and seems to be at the heart of the material. Much of the material is geared to experimentation, discussion, testing and analysis, with extraordinarily good materials to guide the student (and teachers) through the process of developing experiments, using the appropriate analysis, and what is important in the reports for justifying one's conclusions. The concept of repeatability of experiments, gathering evidence, and averaging results is used over and over. Every INQ specific has been covered well. **EALR 3** is also well developed, with group work strongly emphasized. So is design of experiments and using models (a model house to test insulation, for instance). Students are encouraged at every turn to design an experiment and test it out – in thought experiments, in hands-on design, and in role-play and letter or report writing. They use real-world examples, and have the students follow how scientists actually work. More than discussion, they have the students BE technicians and scientists, suggesting solutions, and then testing them.

EALR 4 specifics are covered well. For examples, EALR's 4 Atoms and Molecules is very well developed in the unit on Chemistry of Materials and uses models of atoms and molecules, paper clips to explain polymers, and has the students make plastic, and mix other chemicals together to see various actions. They explore conservation of mass during chemical reactions. The coverage of The Periodic Table explains the history of Mendeleev and how he came to understand the periodicity of the characteristics of elements. The Interactions of Energy and Matter is their best Big Idea. They use many different activities to get across energy conservation, and energy transfer / transformation. It's explained using refrigeration, car crashes, motors, electricity, serial and parallel circuitry, etc. They use the story of one girl and relevant issues around her house to exemplify the issues. Students really look at energy efficiency tradeoffs – initial cost versus cost/ time of product life, e.g., types of light bulbs and insulation. They have them do rather sophisticated analysis on homes in various parts of the country that want to update for energy savings, but are on a budget – which items make the most sense for them and why.

This set of material was heads and shoulders above the others I reviewed. SEPUP has been developed quite deliberately for understanding and comprehension around several themes or units. They have studied its use extensively and shown scientifically significant improvement in student understanding (papers accompanying the material). It is not computer-based, though there is internet material available. It is activity-based more than reading. The questions posed in the chapters, and especially in the test banks are amazingly thought-provoking and difficult to answer. They use real-world examples, and trade-offs of cost, environmental impact and quality all had to be considered.

Examples are relatable to students' lives. All the activities, readings and questions were very relevant and built on each other. They used analysis and had them designing and doing their own experiments. Students were asked to make real-world recommendations: students were asked to choose from several computers addressing such complex issues such as recycled vs. new components, type of plastic used, cost, user life. They had to include consumerism, and citizenship of the world issues in the analysis. Using water quality, they explore the cholera outbreaks in London having the students map the deaths and let them come to their own conclusion that the Broad St. Pump needs to be closed. Writing a letter as Snow improves scientific literacy. A

template for the letter makes sure the pertinent information is there. (Honestly, if the students I taught had had this training, I would have to do less remedial work at the college level.) They do a good job of portraying a multi-cultural set of folks in their pictures, and gender parity as well. This is not your usual "amoral" values-devoid scientific material. Overall, I was extremely impressed, and wanted to take Physical Science all over again.

Publisher: Its About Time	**Program Name**: Interactions in Physical Science
Reviewer: Janet F. Ott, , Ph.D.	**Grade Level/Course**: 6-8
Strengths: • Each unit covers its idea thoroughly from several different angles and the activities within one unit relate well to one another • The book is mostly activities so students learn by doing. • Students are encouraged to work in groups and take particular roles (material collector, recorder, etc.) • Waves are covered particularly well. • They do a good job of making sure there is gender equity, and diverse races are throughout the book. • The simulators on the student web site were fun and interesting. They weren't completely intuitive, but most of the items seemed to work as they were supposed to. • They included an optional science fiction story that goes along with the material. I thought the ideas they introduced were too deep for this level (time/space warps), but apparently the story "comes to earth" and connects with the material. • There is a Trivial Pursuit-like game that helps solidify the material through asking quiz level questions. • The seven units each cover its own Big Idea. • They start with what students already think about an issue and then get them to see where they might be "off."	**Weaknesses**: • They say they "put it all together" at the end of the units, but I didn't see it. They come up with a statement about the Big Idea, but it doesn't draw actively from the activities and conclusions in a way that made the overarching idea perfectly clear. • Topics are not really revisited or tied together. • Activities are more theoretical and stand alone, than taken from real-world issues, or tied to them (e.g., circuitry is put together with bulbs and fans and buzzers, but not to make anything of use). • There are a LOT of concepts in each unit, and lots of vocabulary to learn. Sometimes it seems like the vocabulary is emphasized over the ideas. • The teacher's material is difficult to find and in several books. The students, too, have to shuffle back and forth between a practice book and a separate reporting book. To check on one topic, I had four different books open trying to tie the student's activities to the issue being learned. I think keeping it all straight it would be difficult for both the teacher and the student • They said they built on progressively more difficult material throughout the unit, but it seemed more like they were introducing different Ideas (e.g., mass, then density, rather than building one on the other). Further, they never give the students real world examples of how the material gets applied, or introduce the complexities of real life. • The activities were almost too directed, with little encouragement to get the students to

	create their own experiments or decide how to test something. They were led through each activity, and the questions were often asked in the leading way to get to a particular answer. This was true even toward the end of the book, where they say that the lessons are built on the ones before and that students are encouraged to do more independent work. I didn't see that. • Pictures were sometimes misleading. For example, three magnets of different sizes are shown. But the magnets are three different colors, so one is not sure if they are of the same material. Since the questions are about relation of size to strength, and it's in the same chapter and extra variables and good/bad experiments, it seemed particularly misleading. • Circuitry is not covered well. They explain it in words, but circuit diagrams for series vs. parallel are not shown, yet, they ask the students to draw some. • The answer keys are hard to follow. There are practices at the end of chapters in each unit, and also in the Practice book. The key covers some of one and some of the other (I think), but not all. It was confusing. • There was at least one missing piece that I saw – there was a missing voice bubble for "Nadia" who concluded something. The student was then asked whose conclusion did they agree with – Nadia or the student in the other picture. They couldn't answer that question. I saw no "errata" sheet to fix it. • Historical development is minimal. There are short paragraphs to the left in tiny type that are easy to miss. There is no development of how scientists who discovered the concepts came to those conclusions (though they say in the intro material that they do and tie the students conclusions to the Big Idea the scientists come to. I never saw it.
General Comments: **EALR 1** – they cover SYSE very well. The others less well. **EALR 2** is extremely well covered. This is the main focus of the first unit.**EALR 3** - APPA is discussed rather like the historical pieces – in little paragraphs on the side. They are not delved into. I saw little discussion of B (professions in technology and science). And C-H are not well developed.– Balanced and Unbalanced Forces –	

Extremely well covered in all aspects. EALR's 4 - Atoms and Molecules – extremely well explained. EALR's 4 Interactions of Energy and Matter –each type of energy is well explained, and the idea of transformation is discussed. Actually working with those is less clear, simply because they do more writing about, and less working with the concept. They never develop complex real-world examples.

This is one of those interesting sets of materials. It's difficult to find fault with the material itself, since they cover each topic so thoroughly. Perhaps that is the issue right there. There is so much material in each unit that keeping the Big Idea in mind kind of gets lost. It's just too much. There is so much detail and vocabulary to grasp, that the Big Ideas get short shrift. Further, the questions do not go beyond surface understanding, and, I suspect, the concepts are soon forgotten. Though material does build on each other for each unit, it is not tied together across units. Skills are – measuring and graphs, etc. But students are not challenged increasingly, rather, they are asked the same type of questions over and over – the simplistic "Can you explain this concept?" or "measure this"sorts of question. They are led by the hand throughout the book, have innumerable pages of questions and practices to fill out, and though they come, as a class, to a conclusion about each concept, it's written down and that's that. Nothing about that piece of paper indicates that it is special and noteworthy – it's just another piece of paper to fill out. While practice makes perfect (or permanent, as my piano teacher used to say), practicing the same type of activities over and over just makes you good at those. In no way does it make you capable of taking the material and applying to something else.

There were no expansive, real-world questions to create thought-provoking discussion among the students. It was always about answering a specific question. There were only 7 units overall, so there were several main concepts, but lots of smaller concepts within each unit, so the Big Idea got lost. There was a logical and strategic sequence of activities through one unit, though the same kind of activities were used over and over. The material did use multiple and varied phenomena to support conceptual learning. For instance, to look at waves, light, slinkys, water, earthquakes and tsunamis were all used to explain the various characteristics of waves. And there certainly were evidence-based arguments for those ideas.

Only in some ways is there a logical sequence of encounters, and the tying together was a bit weak. More, it was a set of activities, another set of activities, another set of activities, all looking at various aspects of concept rather than building a more and more complex set of discoveries that the students could make themselves. While helium in balloons was used to discuss the relationship between mass and density, and both of those concepts had been discussed, the relationship had not been well established, or it was buried in the detail, so the student would have to make a quantum leap in understanding to grasp how density and mass work together.

The material does draw attention to appropriate conceptual connections, but again, so much might be lost in the detail, it was hard to pick out the big from the little. The assessment tasks range from questions and practices to quizzes and exams, and the various worksheets, (and reports that one hopes the teacher will ask for). Sequential development is there within each unit, but overall, I did not see a greater demand for understanding of how science gets done from unit 1 to unit 7. The level of assessment does not seem to change, and there is not "extra credit" or "thought" questions posed to challenge gifted or curious students. Nor is there a tieback to

history and how the scientists merely mentioned figured out what they did. For instance, there is a picture of Mendeleev, but only a few lines explaining that he found periodicity in the elements. Nothing about how he came to those conclusions. I saw no “evidence for ‘the way that knowledge was arrived at.’” Certainly I saw no assessment tasks that would require an application of the concept beyond the scope of what they learned in the class – no speaking of energy in their own homes, or life-cycle of materials, or the complexities of choice. So while the material does focus on a limited number of fundamental concepts, those are filled to the brim with details, so the concepts themselves are, if not lost, then harder to pick out of the mire. And athough the material’s introductory information suggests that they build to an ultimate conclusion for the intended concepts, those appear to be just another form to fill out, and nothing to suggest “hey, this is the major thing we’re all here to learn.” As a side note, I want to speak about the materials themselves. The Student material is broken into 1) the book, 2) Practices, 3) Report Sheets, 4) online simulations, and, if they are used, a science fiction story and a game. The student has to go back and forth between the first 3 to do the assigned exercises. It felt confusing and annoying. The Teacher’s materials are also in several different places – the Teacher’s Guide, which follows, but does not recreate the book, so one has to have both open, and material to Xerox for the students, along with quizzes and tests, are in a different book as well, and laid out in several sections rather than sequentially as they are used in the book. So one has to flip back and forth among several books, and several sections in one book to see all that is needed for the day or week. The simulations were interesting, once I got to them online (the DVD was not seeming to work for me). You could wire things up and see what happened. The more inventive and curious students would work through all the simulations and get something out of them. Overall, this book did not live up to its introductory material. There was missing information, difficult-to-find materials, too superficial coverage with too many topics, and little real world relevance, and it was too-typical-a-layout of a “textbook.”

Publisher: Glencoe	**Program Name**: Glencoe Intro to Physical Science
Reviewer: Janet F. Ott , Ph.D.	**Grade Level/Course**: MS Physical Science
Strengths: • Covers every topic extremely thoroughly • Tie-ins to other fields – biomechanics, health, geology • Teacher’s edition has student edition within it, and each chapter has it’s own resources, so it’s easy to set up activities • Review at the end of each chapter has some sort of organizing diagram of the information • There are several places where they revisit ideas, e.g., pressure vs. area,	**Weaknesses**: • In spite of lots of interesting sidebar topics, a very traditional textbook – lots of writing, and then review of vocabulary, ideas, and two pages of questions about the minutiae • The thought questions are not very deep, nor do they tie other topics in. No questions that relate to their own lives. • Group discussion/ group work is not really encouraged in the text.

hydraulics and buoyancy • Very little historical tie-in	• Real-world examples are very short and isolated. It's mostly theory and information • Extremely detailed, at a level beyond what is needed for understanding the concepts, in fact, it may get in the way.

General Comments: This is a very typical textbook, in spite of the interesting extras they have. Each chapter is mostly writing to be read. Though there are places that ask questions, or invite experimentation, it is not laid out as in integrated activity, rather as an add-on, or "try this at home." There is no sense of "discuss this with your partner, or group or class." Labs are not tied intimately to the reading. They are for the teacher to decide whether or not to use them. In other materials I reviewed, they were incorporated into the reading and whole class work. The material does convey the purpose of each unit (it would hard to miss, as it's stated at the beginning of each chapter – "you will learn…") and each lesson and chapter fits with the rest in each unit. There were certainly multiple and varied phenomena to support the conceptual learning, but the detail was overwhelming. There is no sense of invitation to explore the material actively, and activities are of the "pick and choose" type for the teacher to decide. Also, they are of very similar type throughout the book, only rarely using writing other than answers to questions to get to an understanding. There were too many Big Ideas - eighteen of them. The ties to one another were strong in some areas and weak in others. But after awhile, it was just a whole lot of material. This was a book that is a mile wide and an inch deep.

There was some historical development about the atom. They spent 11 pages discussing the development of the idea of the atom, from Democritus, to Lavoisier, Dalton, Thompson, Rutherord, and then Mendeleev to take in periodicity. While interesting, I questioned the need for the detail at this level, and I did not see the evidence for "how the knowledge was arrived at." And nowhere else in the book is there much history at all. Newton and Galileo get one paragraph together, with no discussion of the impact their thinking had on the world at the time. It seemed quite imbalanced. For the same topic, they spoke of Chinese and Indian views of matter and compared them to western early views. Also a good thing, but nowhere else in the book did I see other worldviews.

Their real world examples are short and isolated, and not well integrated into the theoretical material. The same is true of integration with other fields. They are there – biomechanics in discussion of force, and music in waves, but little integration or follow-through.

EALR 1 is discussed well in conservation of matter and energy. I saw little of how output of matter becomes input somewhere else (no life cycle of material, except for water, and that only in passing – no look at input, output, pollution, etc.). There was no discussion of complex societal issues at all. **EALR 2** is studied in theory in the first several chapters. But the rest of the chapters are mostly reading as activity. Labs, thought experiments, working collaboratively, creating tests for theoretical ideas, etc., are all up to the teacher to introduce. There is no encouragement or direction within the book, as I saw in the other materials I reviewed, where it is incorporated into the material as a whole. There were only a few times the idea of modeling came up, and exploring what makes a good and bad experiment, or historically where scientists were led astray, and anything about ethical concerns were given short shrift at best. **EALR 3** was covered in how technology differs from science, and different careers are mentioned, but there was little about *being* a scientist or technician, very little designing, building models, and little about other cultures, except for fireworks. Every detail of every **EALR 4** was covered. Obsessively.

Overall, this material is about facts and detail, not about exploration and learning how to learn, question, hypothesize and test.

Publisher: It's About Time	**Program Name**: Investigating Earth Systems
Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: MS Earth & Space Science
Strengths: • **Key Concepts.** The same five key concepts are repeated at the end of each chapter (and just before the next), so messages are clear and consistent. Chapters are well-organized and flow well from one to the next. • **Pre-Assessment.** Each investigation begins with a Key Question and activity to assess students' understanding before instruction. • **Diversity**. Images of students show different racial backgrounds, some students in wheelchairs, etc. • **Evidence**. Emphasizes importance of evidence both in investigations and text. • **Models**. Unit I begins with overview of different kinds of models, starting with model of what is in a "black box" (paper bag), laying groundwork for how Earth scientists construct models of Earth systems. • **Conceptual Development**. Concepts are built up gradually, taking care to start with concrete observations and connecting the dots. • **Activities**. Although most of the labs are designed to confirm concepts, they are mostly good for their intended purpose. There are also a few creative activities, like making brochures about local natural hazards and analyzing science fiction stories to separate fact from fiction. • **Assessments**. Rubrics for student journals,	**Weaknesses**: • **Common misconceptions** are rarely mentioned in the TG or addressed in the student materials. • **Most labs are confirmatory.** • **Not all explanations are clear.** For example, explanation of the tides (a very difficult concept) does not explain why there is a bulge on both sides of Earth, or recognize the drag that causes tidal bulges to be out of synch with the Moon's position. • **Few actual Earth observations.** For example, students learn about the Moon's cycle of phases from their textbook rather than observing the Moon in the sky over a month. • **Differentiated instruction** ideas are not included for students who do poorly on assessments. **Note: although this is a shorter list than strengths, these weaknesses significantly reduce the value of the course with regard to EALR 2 Investigation.**

collaboration with other students, and focus on evidence of learning by students. Also teacher assessment for each unit.	

Description: Investigating Earth Systems was developed by the American Geological Institute (AGI), a professional organization of 500,000 Earth scientists with a strong commitment to education. Printed materials consist of one hardbound textbook for the students (about 300 pages) and six paperback volumes for the Teacher Guide (about 1,800 pages in total). A map of each unit to the National Science Education Standards (NSES) indicates "hits" in the areas of Unifying Concepts and Processes, Science as Inquiry, Physical Science, Life Science, Earth and Space Science, Science and Technology, Science in Personal and Social Perspectives and History and Nature of Science. Each investigation lists direct links to both the NSES and Benchmarks for Science Literacy (Benchmarks) from the AAAS.

General Comments: Overall this is a solid course. It includes virtually all core concepts in Earth and Space Science for grades 6-8, which are mostly carefully and thoughtfully developed, and reflective of the same Big Ideas as in the WA Science Standards. Also a very good showing of EALRs 1, 2, and 3. Assessments are rubrics for judging diagnostic questionnaires as well as student journals and group work, and questions for reflection after every chapter. Also good questions for teacher reflection after each unit, including evidence for student learning. Its primary shortcomings are scant attention to students' common misconceptions and primary reliance on confirmatory labs. These weaknesses are quite serious and undermine what might have been a very good program.

EALR 1 Systems. As one would expect for an Earth science curriculum this one does a nice job with systems (6-8 SYSA). Students are frequently encouraged to write connections that they find on an "Earth System Connection" sheet. Also, Earth as a whole is presented as "a set of closely linked systems." (6-8 SYSF) Boundaries are described (6-8 SYSB). The idea is expanded when moving from Earth systems to the solar system. There is good guidance in the TG about how to help students understand systems concepts at many points in the course.

EALR 2 Inquiry. Unit 1 does an excellent job with patterns of evidence (WA Standard 6-8 INQC) and modeling (6-8 INQE)—that is, collecting evidence from hands-on observation, noting patterns, then extending their understanding to the Earth as a whole. Concepts are built up gradually, taking care to start with concrete observations and connecting the dots. For example, Unit I starts with a "black box" activity in which students collect evidence about the inside of a sealed paper bag and create a model for what's inside, even though they can't see inside. In the next investigation students measure the speed of water waves and observe refraction of water waves. They then apply these insights to seismic waves, and see how scientists infer that Earth has a core.

However, the text does not do so well in requiring that students distinguish between the results of an experiment and the conclusions to be drawn from it (6-8 INQF) probably because the authors want to emphasize understandings about Earth as a whole (e.g. how we know Earth has a core), so this is understandable in this context. Regarding how questions drive investigations the curriculum does fairly well in having students make and test predictions (6-8 INQB), but does not identify different types of investigations. The "investigations" are for the most part, confirming activities. Finally, while there are good connections between questions and investigations (6-8 INQA), the students do not identify the questions—the text does. However, there are a few cases where students are asked to formulate a hypothesis and design an experiment to test it. (6-8 INQH).

On the other hand each investigation (chapter) ends with a set of very good Reflection questions, including some that focus on connections within the Earth System, and thinking about the nature of scientific inquiry presented in the chapter.

EALR3 Application. There are good examples where students apply what they are learning to their local areas, as with finding rocks and rock formations that are presented in the book. In one section students investigate the natural hazards in the area where they live, and develop a brochure warning the public about the hazards and how to reduce the most serious consequences of natural catastrophes such as earthquakes and volcanoes. (6-8 APPD and 6-8 APP). This is done early in the curriculum so students see some practical value in understanding Earth science.

EALR4 Earth and Space Science. Overall there is excellent coverage of the major topics. Following are some details on each of the three big ideas.

6-8 ES1 Solar System. Fairly good coverage of all core concepts, with the exception of eclipses, and poor presentation of tides (which are not in our standards anyway). Ideas are developed logically, with a good activity to model solar system objects using the same scale for distance and size. Also good section on galaxies. However, the reason for seasons given in this section (not included at middle school level in WA standards) is somewhat worse than most textbooks in that it begins by mentioning the 41,000 year shift in the tilt angle of Earth's axis before even attempting to explain how the tilt causes seasons. The rest of the explanation is cursory and not easy to understand.

6-8 ES2 Earth Systems, Structures and Processes. Especially good presentation of Earth systems at many points in the book, also emphasized in the TG. All core concepts are included and fairly well treated. Good sections on weather and climate (including changing climate over past few thousand years), rock cycle, erosion and weathering (including chemical, physical, and biological weathering.) Good sections on sedimentation, idea that current processes went on in the past and give clues to Earth history.

6-8 ES3 Earth History. Also fully covered and well-developed. Good section on fossils, including making casts, interpreting fossils, and connections to biological evolution. (There is a photo of the peppered moth in connection with text on speciation, but the species is not mentioned which is good, since the experiments with peppered moths in England have since been discredited. It would be best if this photo could be replaced with something meaningful in future.)

Teacher Guides (TG). As in most sets of instructional materials the Teacher Guide is huge, nearly 2,000 pages divided into six thick paperback books. They are well illustrated, and provide useful background information and sound ideas for instruction. However, there are some shortcomings, as described below.

Common Misconceptions of students are rarely mentioned. For example the common misconception that moon phases are caused by Earth's shadow on the Moon (the reason for eclipses, not phases) is not mentioned in the TG. In fact, eclipses are not mentioned at all, even though they are easier to understand that phases and it's important for students to learn to distinguish between the two phenomena.

Publisher: Carolina	**Program Name**: STC Earth/Space

Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: MS Earth and Space Science
Strengths of Earth in Space: • Excellent pre-assessment activities, have students survey different ideas of their classmates. • Textbook is activity-rich, with good diagnostic assessments, sky observations, interwoven with appropriate text. • Photos and illustrations show diversity of students. Very clear illustrations of activities. • Good modeling activities help student make sense of their observations. • Good summaries of common misconceptions in the TG • Good comparisons of Earth with other planets in several lessons (tilt of axis, solar energy received, etc.) • Nice observations of sunspots activity • Good exploration of solar system math before students create a model following instructions • Good activities involving gravity, to understand how gravity acts on the planets and introduction to Newton's laws • Good section on fossils as evidence of change, including asteroid from 65 million years ago.	**Weaknesses of Earth in Space**: • Weak moon phase observation activity (see below). • Very poor activity modeling moon phases, coloring one side of moon black reinforces misconception about "dark side of the moon." • Uses complex illustrations of moon phases and eclipses shown in other studies to confuse students. • Presents seasons activity involving Earth's tilt. While some students will understand this ist is a difficult concept for this level. In our standards it is high school level. • Many of the best activities are not in our standards. Good section on sunspots and solar wind, on space exploration, tides.
Strengths of Catastrophic Events: • Good idea to use exciting events as a hook. For example, water cycle introduced in context of how hurricanes develop. • Nice activity observing how water and air heat and cool. • Nice activities with "convection tubes" illustrate how air warms over land, how air moves. • Nice demo of "cloud in a bottle" • Good readings, images. Show diversity of students. • Open-ended Anchor activities in which students choose what they will investigate. • Good activities with slinkys and waves to illustrate seismic waves.	**Weaknesses of Catastrophic Events:** • Nearly all are confirming labs, not open-ended. Students are told exactly how to vary trials. Very little is left up to them. • Disk that comes with TG with essay just for WA review says "The STC Program™ units explore life science, earth science, and physical science with technological design." But I could find no examples of that. Seems to be "boiler plate" text with WA reference at the top.

• Nice modeling of tectonic plate movement, observation of earthquake patterns. • Good observations of convection in air and various kinds of liquid. • Good investigations with viscosity to simulate volcanic lava flows, formation of islands • Experiments with crystal growth and cooling, relates to different types of rocks	

Description: These two units were developed by the National Science Resource Center (NSRC) a highly credible organization that draws on the Smithsonian and National Academy of Sciences. Each unit includes paperback student books, about 300 pages each, and a teacher guide in a binder, also about 300 pages each, with a CD. The CD contains all of the handouts, so these can be printed in appropriate quantities. That means the textbooks can be re-used, and the teacher need print no more handouts than they need for the number of students they have and the specific lessons they will teach. (Same handouts included in the TG as black line masters.) Recommendations are given for a full K-8 articulated science program using all of the Science and Technology for Children (STC) units and the Science and Technology Concepts for Middle Schools (STC/MS) units. Lessons follow a four-part learning cycle: Focus, Explore, Reflect, and Apply. The units include both formative and summative assessments, including diagnostic assessments, assessments embedded in the activities, end-of-unit questions and performance assessments with rubrics.

General Comments on "Earth in Space": This unit has some good features. Because it is part of the Smithsonian it had some excellent sections on the planets and space exploration. It also covered all of our EALR4 core concepts with the exception of anything beyond the Solar System. (WA standards follow Benchmarks for Science Literacy in that we include the galaxy; but most state standards stay with the Solar System exclusively, as does the NSES.) Regarding inquiry, some of the activities were well-done, like tracking shadows and reproducing them with flashlights. However, some of the most basic activities were very poorly done. Painting a moon model black to show its shaded side supports misconceptions about the "dark side of the moon," and activity sheets on the solar system are unnecessarily complex, more likely to confuse students then to help them understand the core concepts.

General Comments on "Catastrophic Events": Opens very nicely by having students create a concept map to show what they already know about the topic. And, this set of materials does a good job of covering nearly all of the WA core concepts 6-8 ES2 Earth Systems, Structures and Processes (with emphasis on cycles), and 6-8 ES3 Earth History (with emphasis on evidence of change, including the fossils lesson in Earth in Space). There are lots of activities that give students experience with relevant phenomena, good readings, and linkage of the major concepts presented in the investigations. My main concern is that there are almost no realy exploratory activities. Student "exploration" is tightly guided procedures following precise directions about what trials to conduct, how to record the data, and how to draw conclusions. So my overall response is mixed. Given the excellent credentials of the developers I was quite disappointed.

EALR 1: Systems

Text and activities handle the Solar System nicely, though systems concepts are not emphasized.

EALR2: Inquiry

My review is mixed. Earth in Space starts out very strong, with students surveying all of the students in the class about their various ideas about the solar system. There were also good activities throughout in which students did things and were asked to make sense of it on their own before reading text about it. However there were several weak activities that have been fully developed elsewhere, such as activities involving lunar phases and eclipses.

Catastrophic Events starts out with a very good diagnostic activity in which students make concept maps to show what they know. It has a lot of good activities so students can become familiar with phenomena, such as convection, heating of air above earth or water, viscosity of lava, etc. However, these are all rather constrained, with details of the number of trials given. It's not bad, but could be made a little more open-ended.

EALR 3 Application

There is some discussion of spinoffs of space exploration and various professions related to astronomy in Earth in Space.

There were surprisingly few sections of Catastrophic Events that were application-related. Students did investigate how houses are constructed in earthquake zones, but I think more could have been done with all of he catastrophic events to show how people can reduce their risk in each case.

Regarding careers (part of Application EALR) there a few examples of people working in jobs related to the science subjects, but almost none of the many engineers who design structures to protect lives during catastrophic events, or who design spacecraft. (Just one technician and a handful of scientists were featured in Earth in Space. There were a few more scientists in Catastrophic Events, but most were just labeled "a volcanologist," etc with no info about them or what volcanologists do. One exception was a meteorologist.

EALR 4: Earth in Space (sampling)

Night and Day, year. Begins with good hands-on and eyes on (observations) activity that reviews core concepts from 4-5 Earth and Space concepts—model of Earth-Sun-Moon system, tracking shadows and explaining night and day and Earth's yearly solar orbit.

Seasons: Goes perhaps too quickly to modeling seasons, but the activity is well-planned and has potential to be effective, although in WA standards this is at a high school level.

Lunar phases and eclipses: Observation activity is weak. Homework assignment focuses on moonrise and moonset times and “general appearance” rather than emphasizing accurate observation of shape and relation to the sun.

Solar System: Lots of good details on the solar system throughout the book. Students make models, consider features of the planets and moons, and investigate other solar system bodies.

Gravity: Good activities using rolling balls on latex sheet to illustrate how gravity keeps planets in orbits. Text pretty good too.

Includes all core concepts except 6-8 ES1E, that our sun is one star among many in the galaxy.

EALR 4: Catastrophic Events (sampling)

Nearly all the core concepts are included. All of the cycles are included, including water cycle, rock cycle, how landforms are built up and eroded, the effects of tectonic plate collisions, etc. Earth history is pretty well covered too, including a unit on fossils in Earth in Space.

Will students develop these concepts through this course? Yes, mostly. The activities are actually pretty good at giving students experience with the phenomena, even though they are not very open-ended. For example, students should be able to understand how islands are built up as magma solidifies, and the convection currents that drive weather systems. Too bad the activities are not fewer, with more time and suggestions for students to explore.

Publisher: Lab Aids	**Program Name**: Issues and Earth Science
Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: MS Earth and Space Science
Strengths: • Good portrayals of other students’ work. It’s a nice way to get them to be critical of what’s in the text, not just accept it. • Each unit begins with puzzles to investigate. Very strong on inquiry and evidence, especially as ES3 focus in WA standards is “Evidence of Change.” • Also very strong on application, as many of the puzzles have practical use—what’s wrong with the soil so the garden won’t grow? How do you tell a real diamond from a fake? How to evaluate a building site? How sediments cause problems for construction. Unit on tectonics begins with analysis of Yuca Mt. for storing nuclear waste • Good images and drawings, includes lots of diverse learners.	**Weaknesses**: • The only weakness I found is that EALR1, Systems, was not emphasized in this set of materials. Although there are many examples of systems, as in the case where the ocean system affects the climate system, the systems concepts are not abstracted and applied to different Earth science topics. • There is also no reference to the major Earth spheres—atmosphere, hydrosphere, lithosphere, etc. (although lithosphere is mentioned in relation to a cross-section of Earth.)

Description: One hard-bound textbook, about 300 pages, and teacher guide in two large binders, estimated about 1,000 pages. Includes assessment and differentiated learning system based on research study of these materials. TG includes disk and black line masters for handouts and assessment.

General Comments: This text and related activities are especially strong with respect to EALR 2 Inquiry, and EALR 3 Application, and does a very good job of covering all the bases in EALR 4 Earth and Space Science. There are many hooks to capture student interest, like opening a unit on rocks and minerals with the question of how to determine whether or not a diamond is real or fake. Students frequently read and critique the work of other "students" in the text, and there are some excellent readings throughout. The only weak point is that systems concepts are not explicitly developed.

EALR 1 Systems

- Very little specific information or ideas about systems, although systems ideas are implicit in just about every unit. For example the unit on "the causes of climate" has wonderful sections on how ocean currents affect climate. That's two systems interacting with each other; but there was no discussion of the concept of system. Also I could find no overview of Earth systems (atmosphere, hydrosphere, biosphere etc.)

EALR2 Inquiry

- Unit on Earth in Space begins with critique of another middle school student's notebook on shadows. Very nice way to have students collaborate, even though other student is in the textbook. Then students do their own investigation (need less direction since they saw another students' work already).
- Ideas about seasons built up little by little; first focusing on puzzles (why hotter in summer why longer days, why shadows move as they do). Students do activities, perceive patterns, then explain gradually. Very nice activity with solar cells on how angle of sunlight makes a big difference in power (to drive motor). This sequence may actually have a chance of teaching seasons at the middle school level.
- Moon phase investigation begins similarly. Students identify puzzles, make own observations and compare with data from imaginary student in text. Moon observation sheet is okay. Start when moon visible during day, note date and shape of moon, but not distance from sun. Good TG support for this. Modeling activity is okay, teacher walks around class with moon ball and students observe shadows (not as good as having each student observe shadows on their own moon ball.)
- Brings together moon and seasonal observations with lesson on calendar.
- Nice unit on uses of modeling

EALR 3 Application

- Unit 1 on Soil starts with problem of why a garden won't grow in soil, need to figure out why to reach goal of a garden that grows food.
- Unit 2 on Rocks and Minerals starts out with how to find out if something that looks like a

diamond really is. (good hook for students)

- In unit on Space Science students have debate on whether or not to go back to the moon, consider costs, pros and cons.
- Unit on tectonics revolves around question about whether or not Yuca Mountain is a good site for storing nuclear waste.
- Unit on weather focuses on the various risk factors for people who live in different parts of the country—risk of earthquakes and volcanoes, risks of tornadoes, etc.
- No profiles of scientists or engineers, but some anonymous scientsts are depicted.

EALR 4 Earth the & Space Science — Solar System

- Covers all of the topics in 6-8 ES1, plus seasons.
- Good modeling of solar system to scale, and discussion of modeling as a process.
- Goes from understanding of sky phenomena to space exploration.

EALR 4 Earth Systems, Structures and Processes (6-8 ES2) — Cycles

- Good coverage of all core concepts. Each unit involves the inquiry and application approaches mentioned above, but in a different way each time.

EALR 4 Earth History (6-8 ES3) — Evidence of Change

- All core concepts are included. Although the number of pages devoted to Earth history is not huge, it does emphasize evidence, and has students pay attention to each of the EALRs. Good chance students will understand evidence for Earth history after this.

4.3 High School

4.3.1 Biology

Publisher: Agile Mind	**Program Name**: Biology
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • Good animations for some topics, e.g., diffusion easy to get because of it. • Ease of use • Students get instantaneous feedback about whether they know the material or not	**Weaknesses**: • Level of detail too much in some areas, not enough in others • No working together – mostly individual staring at the screen to watch simulations • Timed out fairly quickly. Had to keep logging back in and finding where I was • "Zoned out" by staring at the computer screen • No themes, challenges, or larger questions or projects
General Comments: I found that the materials were heavily weighted to the molecular. Not necessarily a bad thing, just a lot of molecular biology and not much physiology or anatomy. On some topics, it felt like college-level detail (the macro-molecules found in our food were explored in detail in the first chapter, with the details of bonding, pH, and composition and decomposition of molecules, without giving any sort of overview of how the food	

gets to the cells to do all that. It was a fast leap to detailed information. On other topics, just a skim-through. Homeostasis was spoken about at a cellular level (diffusion) without being put into context; and then a quick, though detailed, look at the urinary system. No other physiological systems were studied. It felt disjointed and jumbled, with no framework to hang anything on. Just bits and pieces. If I were a student, I'd wonder, "where's the heart in all this?" "We saw the food and then went to the cells – how does the food get there?"

In their manual, they have three sample chapters and use handouts, such as comparing DNA and transcription / translation to an architect and blueprints, which the students fill out. I saw mostly fill-in-the-blank materials, and the assessments and tests were the typical. There were no overarching themes, and the labs were relatively simplistic, and often could be "done" on-line as simulations. I saw no sense of working in groups, tackling issues as a team, and no larger projects were suggested that I saw.

Each chapter does have an overview and summary. The purpose of each chapter is clear. There were some "chunks" of material – Macromolecules and Cells (7 chapters), Genetics and Evolution (6 chapters), and then some orphans – Behavioral Responses (1), Matter and Energy in ecosystems (1), Population and Species Interactions (1) and Modification of Ecosystems (1). This gives the overview of their emphasis clearly, and shows the development of a limited number of fundamental concepts, in this case, perhaps too limited. I would not say that they provided multiple or varied phenomena to support learning of the Big Ideas. And though it is evidence-based, it is no exploration-by-the-student-based. Inquiry-based is also in question, as the students can guess at any point, and then be immediately told the answer, even to the "explorations." For the two Big Ideas that they work with – macromolecules and cells, and genetics and evolution, there is a logical set of encounters, and they are tied together. For the other ideas, no. While assessments do test the conceptual learning, it is not "embodied" unless the teacher took it several steps further, nor are the students asked to apply the conceptual learning to another topic. There was no "closure." It was not transferable. History was noted, and some development of the idea. In Mendel's work, they have the student "cross" pea plants and grow a new generation. Then they pop into allele's and genes and chromosomes without explaining that Mendel knew nothing of these, and while using pea plants as the whole organism example, they use sperm and eggs rather than stamen and pistils when they show the chromosomes. Confusing to the relatively new learner of this material.

As to the EALR's: **EALR 1** is covered, though not in the way that other materials used it. Here the concepts were explained, but not explored and examined. No sense of complexity of interconnectedness was looked at, nor was any complex issue facing the world today introduced, so students were not asked to offer solutions or explore the idea of difficult trade-offs. While Agile Mind offers a whole list of places they cover the inquiry EALR's (**EALR 2**), I saw little in the way that other publishers had students explore. I saw none of the working together, none of the complexity explored. While they may have in-class labs, they were not laid out that way on-line. I saw little in terms of explaining the difference between evidence, inference, or why some thinking about an issue were hypotheses and other were theories. Investigations were simulations, conclusions were given, even though questions such as "How did that result compare with what you thought might happen?" were given. The next screen would always give the answer. There were no tough, thought-provoking, discuss-with-your-colleagues how can this be? kinds of questions. They had none of the discussions other publishers did about how science gets done, or the importance of scientific thinking, and no distinguishing between science and technology, which brings us to **EALR 3**. Applications were critically missing. They do show evidence for everything but **APPC**, but it was slim evidence indeed. Again, these ideas were touched on in a discussion fashion, but there was none of "now you tackle these issues and wrestle with them for awhile" than I saw in much of the other materials. The **EALR's 4** were hit and miss. They do cover a fair number of Physical Science EALR's – the PS2's were nearly completely covered. In that way, they are interdisciplinary. The **LS1's** are covered extremely well. This content is really the heart of the material. The **LS2's** are covered but no explored. What I mean is that that issues are explained, but there are no questions about "What are the conflicting issues?" "What can we do?" "How is this affecting your community?" It was all in theory. The **LS3's** are also covered and some in depth. It, too, was one of the Big

Ideas. Overall, this material covers the Life Science Big Ideas Washington State wants covered. However, the manner in which they are covered is by reading, albeit on the computer. And there are some cute, though simplistic, simulations. There is little inquiry, little thinking, and very little thinking like a scientist. Students need to engage actively with material. This was entirely passive intake.

Publisher: Kendall-Hunt (BSCS)	**Program Name**: Biology: A Human Approach
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • Inquiry-based rather than reading and end of chapter questions • Organized around 6 main themes – Evolution; Homeostasis; Energy, Matter and Organization; Reproduction and Inheritance; Development; Ecology • Accompanying DVD material was good – relevant, not overly introduced or analyzed – they let the material speak for itself and used appropriate clips for study and analysis. • Essays at the end of the chapter and the accompanying material for activities were at an appropriate level of detail. • Emphasis on group work and collaborative learning	**Weaknesses**: • Disjointed concepts within the overarching themes. The concepts and activities were not well tied together, nor did they build to larger and larger conceptual development. • There was no "closure" at the end of each unit. • Teacher Materials difficult to negotiate – incomplete instructions; necessary materials in several places • Essays were at the end of the chapter, not inserted where they were referenced, so students have to flip back and forth. • Answers to questions in activities were often on the next page, making it too easy for students to explain phenomena without having to think about it first, e.g., why people died from flu in 1925 and not in 1945, and again began dying in the 60's, when the next page showed the graph of penicillin resistant Staph.
General Comments: BSCS attempts to use larger themes to cover important topics in Biology and they pick appropriate themes. The material aims high but is missing the mark. They use inquiry extraordinarily well. And integrated material is often the best way to understand concepts, by having a framework to hang it all on. And though they use overarching themes in each unit, connections are missing that would link one concept to others that they use to exemplify the theme. They do use a "critter" that they introduce in the first unit and revisit in 4 of the 6 units. But these are visitations, and not a compelling problem, challenge, or project that will culminate in some product at the end of the year. Each chapter's material feels disparate rather than related, and while the activities are useful to understand each concept, they are not explicitly integrated one with another. The activities often seemed isolated, rather than well connected. They certainly use multiple and varied phenomena to support the conceptual learning. In Evolution, they use how human's are different from other animals, especially other primates; they compare sheep, primate, and human brains; they look at length of childhood; then they look at Lucy, putting human evolution in the larger evolution of the earth; they glance at culture; they explore diversity, Zebra's	

Stripes, and they introduce the student's "critter" with which they use to look at various aspects of life.

They start well. It was the best set of exercises I saw in all the materials I reviewed to begin students thinking and acting like scientists. The first exercise is to blindfold one of a pair of students, and "mute" the other. Those students could not speak to their partners. They had to come up with some form of communication to get the "blind" students to set up a set of materials to replicate the ones in the front of the room, so they were required to create a sort of code with each other. In the discussion that follows, students get how important communication is. They go on to do some drawing exercises so they get used to observation and writing and drawing in their science journal, which they are required to bring every day to class. The activities go on to have the students explore the various aspects of biology in activities rather than reading long chapters. They cover well what makes a good question, showing refinement to make a question testable. They also cover well the difference between a hypothesis and theory and how theory is used scientifically as distinguished from common use, and they use it with Darwin – directly addressing the obvious theological argument without explicating saying so - brilliant. There are essays rather than summaries, questions, or problems at the end of each chapter. The questions are in the material itself. It might be useful to have the essays imbedded where they are introduced as well, since likelihood of reading goes down if students have to go searching. Much of the material is like that – students need handouts from the teacher, who has to download from a CD (they are not in the printed teacher material), they need to watch a DVD to answer certain questions. The DVD is great, but the teacher would need to set up a projector so the whole class can watch or buy enough sets so students could have them at computer stations. The biggest issue with the material is that it is not tied together. The students are not led to see the connection between size of brain, length of childhood, evolution, diversity, and the finding of the ice man. They are all disparate aspects of evolution. There is no culminating set of activities that use all this accumulated information to come to some closing conclusion. There is not culminating project, or big question. They do use an instructional model that they call the 5 E's: Engage, Explore, Explain, Elaborate and Evaluate. And they use it in every unit. So the strategy is consistent. And they do bring some ideas back again to look at them with a new theme – for instance, length of childhood in evolution and again during development. I just found it difficult to see how the students would grasp the really Big Ideas with little guidance to that end.

So, what of the EALR's? **EALR 1** is covered in great detail. They have an entire unit devoted to homeostasis, looking specifically at systems, how they fit together, inputs, outputs, feedback, complexity and equilibrium. Done. **EALR 2** is equally well explored. The whole is inquiry-based, getting the students to ask and evaluate questions, collect and analyze data, draw appropriate conclusions (and ask whether those are the only conclusions that can be drawn), distinguish between hypotheses and theories, what is good evidence, modeling, looking at repeatability and reliability of data, and presenting those data to the group as s whole. Again, Done. **EALR 3** is explored less well, and they missed some great opportunities. I saw little distinction made between science and technology and little exploration of problems. Though they bring up recycling and the carbon cycle in the energy unit, they have a great opportunity to speak about global (and even local) issues of food consumption, feeding large groups of people with what, and how technology might affect that. They only discussion of genetic engineering was about cotton! I saw even less about societal problems, and no activities that I read (granted, I didn't get to them all) addressed

complexities that involved trade-offs or struggling with obviously imperfect solutions. The activities usually came to the obvious "pat" answer. They mentioned, though did not go on to explore the types of questions that it takes a scientific mind to answer – euthanasia, health costs and policy issues, feeding an increasingly hungry world, etc. Overall, I think they did a poor job here. The **EALR's 4** were hit and miss. Because the material was in thematic units (and that's a good thing), sometimes finding the specifics was difficult, so I may be missing some that were actually there. **LS1A, C, E, G, H** are well covered; cell respiration and it's relationship to fossil fuels and energy transformation (**B**) the importance of cell membranes and all that they do (**D**) as well as food conversion (**H**) was less well covered. This last had bits and pieces covered, but a student couldn't take a piece of food through the whole process, even in overview. **LS2** as a whole is not covered very well. Several of the topics are touched on, but not well explored, and some topics are missing altogether – biodiversity, sustainability, and renewable resources, for instance. On the other hand, **LS3** is well covered in it's entirety, having a full unit devoted to that topic, and revisited later in the book when appropriate. Overall, this text does some things very well, and others not at all well. It is a mixed bag, that the adopter will have to decide whether the strengths outweigh the weaknesses.

Publisher: Glencoe/McGraw-Hill	**Program Name**: Glencoe Biology
Reviewer: Maureen Munn, Ph.D. Review focused on LS1	**Grade Level/Course**: HS Biology
Strengths: • The teacher edition has suggestions throughout for teaching a variety of learners. • The Chapter Organizers for each chapter in the Teacher edition clearly state the objectives, National Standards addressed, activities, and time required. • Each chapter of student edition clearly states its big idea and several main ideas (each discussed in a separate section). • Assessments are integrated throughout as well as at the end of each chapter. • Content standards are thoroughly taught. • The curriculum can be adapted to teach different levels (basic, general, or honors biology). • Overall, diagrams are clear and accurate, although they are often complex. • Curriculum begins with ecology, a topic that is both engaging to students and allows for students to make their own	**Weaknesses**: • The many books and references provided with this curriculum have the potential to be helpful, but they also make it very complex to implement. • There is more focus on learning of facts than of concepts. For example, the discussion of meiosis spends very little time talking about the importance of genetic variation to both an individual and a population, but rather focuses on the steps involved in this process. Although there is a paragraph called "Meiosis provides variation," this concept does not drive the discussion, but rather comes at the end of it. • Review questions tend to focus on regurgitation of facts rather than understanding and extension of concepts. In Chapter 6, p 155, questions 3 and 6 focused on topics that were not well explained in the text.

observations. In many curricula, ecology is presented last and only too often not taught due to lack of time.	• In general, the labs do not lead to thoughtful reflection or data analysis. • Does not systematically integrate cross-cutting ideas.

General Comments:
At its core, Glencoe Biology is a very traditional biology textbook that has been retrofitted with additional documents and teachers instructions to support hands-on labs and teaching for a wide range of learners. Content is accurate although encyclopedic. Learning is not driven by trying to answer key questions in biology. The cross-cutting ideas are only marginally addressed. The many supporting documents, although potentially useful, would require some familiarity in order to be useful. Professional development is available from Glencoe.

Materials provided include: teacher and student editions, *Reading Essentials for Biology*, a learning guide for students, a lab manual with additional labs, unit lab books with pages that can be copied for each lab, a science notebook to guide student learning (fill-in-the blank pages), books on open and guided inquiry in biology, a laboratory management and safety manual, and the Dinah Zike's Teaching with Foldables for Science and Math .

Publisher: Pearson (Prentice Hall)	**Program Name**: Pearson Biology (Miller & Levine)
Reviewer: Maureen Munn, Ph.D.	**Grade Level/Course**: HS Biology
Strengths: • Development of text supported by program evaluation • Incorporated *Understanding by Design* principles into each lesson—enduring understandings, big ideas, essential questions, key questions are clearly articulated in student edition. • National Science Standards mapped to content • Chapter 1 focuses on the nature of science, including both experimental and observational science; communication of results; scientific theories; science and society. Discussion accurately reflects how scientific research is conducted. • Chapter 1 defines 10 big ideas in biology that provide a conceptual framework for student understanding of biology • Discussion of the nature of matter is clear, concise, and accurate • Chapter Mysteries pose a problem that	**Weaknesses**: • Relies heavily on direct instruction, even for topics that are naturals for an inquiry approach, such as the "characteristics of living things" (pp 17-119 SE) • Students do not build models of the macromolecules of life, so they rely on linear drawings for their understanding of molecular structure.

students solve as they learn concepts presented in the chapter. • The Laboratory Manual contains a lab for each chapter. The labs are well laid out and ask students to apply and extend what they have learned. At the end of each lab is a recommendation for a student-designed lab. • Diagrams and figures are clear and beautiful • Photosynthesis, and cellular respiration and fermentation are each presented in two sections, an overview and a more detailed discussion of the process. This provides options in presenting these complex pathways, as the overviews are sufficient to teach the concepts if additional detail is not required. • Chapter 14 on Human Heredity and 15 on Genetic Engineering provide opportunities to discuss science and society, science and technology, and bioethics.	
General Comments: Miller and Levine Biology is essentially a traditional textbook with some elements of inquiry integrated into it. It is very well written and readable at a high school reading level, builds on concepts in a rational manner, and provides some opportunities for students to conduct analyses, think logically, and connect science to technology and society. All LS1 Content Standards are addressed. Curriculum package includes the following: Teacher edition wrap-around text student text (not provided for review); ELL Handbook; Multilingual Glossary; Study Workbook A; Study Workbook B: Reading Foundations; Encyclopedia of the Human Body; Laboratory Manual A. There are online resources, Untamed Science Videos, and a Virtual Biolab.	

Publisher: Kendall/Hunt	**Program Name**: Insights
Reviewer: Maureen Munn, Ph.D.	**Grade Level/Course**: HS Biology
Strengths: • Designed as an inquiry program • Designed to address 3 needs: science literacy, understanding of biological processes to make health decisions, and critical thinking skills.	**Weaknesses**: • This curriculum is intended to be taught in the order presented, so a teacher who prefers a different order may inadvertently miss teaching key concepts. • Ecology is the final unit, so it's important

• Stated goals match intent of science EALRs: Explores core concepts of biology in context relevant to students; presents unifying themes of biology in several contexts; focus on social, economic, and ethical issues and decision-making; develops skills to transfer knowledge to new situations, develop critical thinking through lab experiences, inquiry activities, role playing, and case studies; provide support for teachers; engage students in inquiry; cultivate in students appreciation of biology. • Built around 3 frameworks: Teaching/Learning; Science thinking and Process-skills; Assessment • Teacher edition has guidance on developing a classroom community, concept mapping, models, use of technology, discussion, inquiry, critical thinking, and classroom safety. • Each unit starts with a unit calendar that presents the components of each lesson. • Directions for teacher, possible student answers, etc. are clearly laid out in the teacher edition. • Frequent career profiles are provided throughout the curriculum. These include the education level required for the job. • Many complex processes, such as photosynthesis, are taught with an emphasis on conceptual understanding without providing a lot of molecular detail. • Diagrams are clear and simplistic. • Students use a science notebook for their work rather than filling in photocopied sheets.	to complete the curriculum in order to include it. • During discussion of metabolism, curriculum does not always use the names of the cycles and pathways. Although vocabulary can make learning of complex topics difficult for some students, voiding all vocabulary may make it hard for students to recall what they've learned in later subsequent biology courses. • Curriculum does not discuss recombination (crossing over) during meiosis. • Activity on Human Genome Project (p 270-273) does not reflect advances in project between 2003 and 2007 when curriculum was published. • There are few extensions for advanced learners.
General Comments: Insights is designed as an inquiry program for 9th/10th grade introductory biology. It is purposefully shorter than many equivalent curricula. It does not try to serve multiple course types (i.e. such as both intro **and** advanced). All life science content for grades 9-10 is taught. The three crosscutting ideas are integrated throughout. It is important to teach the entire curriculum to "cover" all life science content.	

Materials provided include: Teacher wrap-around edition, teacher resource CD, teacher test generator, student edition, student notebook (provided by teacher). Students are guided in proper use of a science notebook. The teacher edition also contains references to SciLinks, a website developed and maintained by the NSTA. Student learning is activity and lab driven, with thoughtful assessment and follow-up to ensure that students grasped the concepts being taught. The progression of activities is thoughtful and builds on prior concepts. Questions challenge students to apply concepts they have just learned in different situations. Scientific method is taught in the context of doing the labs. For example, in an early lab experience in Chapter 1, students learn about hypotheses, including how they are worded and tested. This curriculum is nicely laid out to make a teacher's job in implementing it very straightforward. There are many activities to prepare for students, and this may be a challenge. However, there are clear instructions for advanced preparation. In one local school district that has used this curriculum in all their introductory biology classes, teachers in different sections take turns doing the prep work for all the sections to reduce their work load.

4.3.2 Chemistry

Publisher: It's About Time	**Program Name**: Active Chemistry
Reviewer: Dharshi Bopegedera, Ph.D.	**Grade Level/Course**: HS Chemistry
Strengths: • This text covers all of the content required by the Washington State 9-12 Science Standards. Some extra concepts are included as well. • Historical development of concepts is evident, including evidence for the way that knowledge was obtained • The concepts are developed in a logical sequence starting from the easiest to the hardest • The material develops an evidence-based argument for the Big Idea • vocabulary terms are stated • Assessment is built in throughout the chapters as well as at the end of each chapter and these support the sequential development of student conceptual understanding while informing instruction	**Weaknesses:** • The language in the text is toned down too much and hence is more appropriate for middle school students than high school. For example using "chem word" instead of "vocabulary" is unnecessary at the high school level. I had difficulty finding value in some of the phrases used in the text such as "chem talk" and "chem to go." Similarly, concepts are communicated using "fun activities" and "games" instead of "experiments" or "demonstrations". Using proper technical terminology is an important component of learning at the high school level. • Students are asked to draw Lewis dot structures for sodium chloride (which is an ionic compound). This will lead to misunderstanding because Lewis dot structures are only used to show bonding in

• The concepts are revisited and summarized at the end of each chapter and provides closure to the intended learning concepts • The material focuses on the development of a limited number of fundamental concepts • The material does convey the purpose of each unit providing an overall sense of purpose and the relationship of one lesson or unit to another • Suggestions are made throughout the text to allow students and instructors to take their learning further by doing research on specific topics • Some interdisciplinary connections are made (specifically with physics) • Reflecting on a central question(s) pertaining to each chapter at the beginning and the end of each chapter is a highlight of this text • 'Inquiring further" options are provided to involve advanced learners • Strategies for students with limited English language proficiency is are provided for the instructor • Teachers are provided information on "differential instruction' to help accommodate learners at different ability levels	covalent compounds • Each chapter contains a "challenge activity" (making a movie special effects, creating a game to teach a concept, creating a work of art) that requires students to work in groups to produce the desired result. While this may work well for some students it may distract from the main goal of learning the concepts, especially if being successful at each of the challenge activities take precedence. Use of technology is non-existent. • Solving complex problems using a step wise process is not sufficiently addressed
General Comments: **EALR 1** is fairly well addressed using activities with materials and environments students are familiar with. Emphasis is given to the activities more than to the conceptual development of the models for the structure of the atom and the limitations of these models. **EALR 2** is well covered using in class and challenge activities (group projects). In class activities can be done in a classroom setting that can lead to a deeper understanding of the concepts. **EALR3** is not covered. There was no reference to technology or how the "big idea" could lead to development of technology that is useful to society. **EALR 4** that is concerned with the fundamental properties of matter and how they interact with each other are well developed. The concepts that enable students to understand atomic structure, and the ability of atoms to form compounds are fairly well presented although I noticed at least one possible misconception (Lewis structures). Fair attention is given to assessment tools that ensure students' understanding of all the concepts in the "big idea". The text is weak in addressing the fact that real life issues are complex and require a step wise process to simplify and analyze them. The text is quite strong in its inquiry based approach to understanding of the concepts.	

A creative teacher could use the end of the chapter “challenge activities” to their advantage. For example the students working in small groups could be directed to pick one of these activities as a project for each semester (instead of at the end of each chapter) so that each group is working on a different activity. The results could then be shared in the classroom as presentations. Supplementary materials included overhead and blackline masters and a test bank. I am unsure whether the text has a solutions manual or a students’ study guide. The authors have gone to great pains to explain that this text is different from others and why and how it is different. Much space is devoted at the beginning of the Instructor’s copy of the text on how this text can be used effectively in the classroom.

Publisher: W H Freeman	**Program Name**: Chemistry in the Community
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • Organized around 7 major themes, often with social problems involved and explored • Complexity of issues taken into account • Inquiry-based – use of labs to explore • Main theme revisited regularly • Conclusions come to with main challenge of the unit • A variety of methods used to assess understanding – labs, questions, tests, writing, role playing • Questions at the end of the chapter looked beyond the material to explore other issues of complementary relevance using their new-found understanding • Use of math skills developed – algebra in chemical reactions and solutions; graphing • Easy-to-use wrap around teacher text • Test bank extensive, and have objectives and difficulty reading for each question listed	**Weaknesses**: • Group work not explicitly addressed • Typical text layout – reading, with summary and questions at the end of the chapters
General Comments: Freeman and the American Chemical Society have teamed up to create a chemistry text that gets across the Big Ideas, at the same time using themes and challenging questions to explore the material. There are 7 unifying themes, set in the fictitious township of Riverwood – Water quality; Coin design (material); petroleum and energy alternatives; Air quality; Quality of life – employment opportunities vs. quality of life when two chemical companies want to locate a plant in Riverwood; Nuclear issues; and Food as chemical energy using “junk food” vending machines in schools as the issue. A strong set of intriguing questions that get at some very important issues facing the world today. Students looking at the concepts with this in mind are sure	

to take these discussions home.

Each unit is relatively self-contained, with the purpose and challenging question set up in the beginning and each chapter and lab geared to exploring aspects of that question. There is a logical sequence, and a culminating activity and set of questions that not only tie the material together to closure, but also extend it beyond to other relevant issues. At the end of the first unit on water quality, for instance, the students each are assigned to a group – agricultural, engineer, sanitation, mining, etc., and have to give some background information about their group's viewpoints on the impact of the fish kill that affected the water supply. They also look at various concepts using multiple phenomena – for instance, in the materials section looking at designing a new coin, they look at alloys, coatings – on cars and semiconductors, electroplating and thin films. The exploration is entirely evidence-based, though they don't specifically discuss the ideas of evidence, inference, hypothesis or theory that I saw, or how the scientific method gets done in the larger world of peer-review, and public scrutiny, per se. They have questions throughout that explore the conceptual connections, and solidify the student's understanding. I didn't see a large development of historical context, though both Roentgen's and the Curie's work were noted.

How were the EALR's covered? **EALR 1** was mixed, even though they used more complexity than most materials to look at these concepts. I saw little about feedback or systems as a whole (neither are in the glossary or index), though equilibrium was certainly covered (**SYSD**), and they spoke clearly and well about models (**SYSC**). **EALR 2** is at the heart of what they are doing, in spite of the fact that they don't explicitly explain or discuss the scientific method as some of the other materials I reviewed did. None-the-less, they have the students generate questions and data, evaluate and analyze the evidence, make conclusions, and create public statements about their work. And these all are around important issues in today's world, not some theoretical ideas that deal strictly with the concept alone. They put the student in the larger context of the world and how it works, effectively putting them to work as scientists and technologists, which brings us to **EALR 3**. They are brilliant at the application of their material. Every **APP** EALR is addressed. They investigate big issues, work collaboratively with other students, see that there are major complexities and have to make tough choices and must question whether they have the very best solution. They see the difference between technology and science because they are "doing" that. They are looking often at trade-offs, often difficult ones, just like in the real world. More than most, this material will ready students for work in the real world, in thinking scientifically, in working with others, and in seeing the complexity rather than in black and white. **EALR's 4** are not all covered simply because they focus on chemistry. The**PS1's** are missing altogether. However, every **PS2** is covered very thoroughly and well, and put into a larger context of life. Only **PS3A and B** are covered, though they do that well. Again, simply because they are focusing on chemistry.

Overall, this set of materials covers this topic extremely well, with an appropriate level of detail for this level. Enough information is given to have the students understand the complexity of the issues, without inundating them with an overload of facts they don't need. Further, this material stresses inquiry, finding and evaluating evidence, and dealing with the complexities of real world issues.

Publisher: Glencoe Science	**Program Name**: Chemistry: C & A
Reviewer: Dharshi Bopegedera, Ph.D.	**Grade Level/Course**: HS Chemistry

Strengths:	**Weaknesses:**
• This text covers all of the content required by the Washington State 9-12 Science Standards • Concepts are developed starting from the easiest and moving in a logical sequence to the hardest • The material conveys the purpose and the relationship of one lesson or unit to another • The material develops an evidence and inquiry based argument of the concepts • The historical development of concepts over a long period of time is evident • The concepts are summarized at the end of each chapter as a study guide • Virtual labs are used to help students understand concepts • Students are guided to do on-line searches on relevant sub-topics to extend their classroom learning • Suggested quick demonstrations are provided for the teacher with the goal of enhancing concepts covered • Lab experiments that are simple to do in a classroom setting are embedded within the text • vocabulary terms clearly stated • Real world applications of the concepts are discussed quite extensively • Analogies (using familiar materials) are used to convey difficult concepts • teacher is provided with suggestions for accommodating students with disabilities with specific experiments and activities they could do • Activities are suggested for advanced learners to help further their learning • Hands-on activities are provided for students who are below level to assist grasping concepts • Connections are made with other disciplines (eg: history, culture, physics) • Mathematical connections are made often • Suggestions are made for using household	• This text reads very much like a college level textbook. While one can see this as a disadvantage, the authors have tried hard to make it accessible to the high school audience by including examples from students' everyday life experiences. Personally I think this is a great way to help high school students transition to college level books.

materials to teach complex concepts • suggestions are provided for identifying misconceptions • Cooperative learning activities are provided • Use of a "chemistry journal" to help students improve writing skills • information on careers in chemistry are provided • instrumentation (technology) is included as a necessary part of skill development • assessment is built in throughout the chapters as well as at the end of each chapter including standardized test practice and these support the sequential development of student conceptual understanding while informing instruction	

General Comments: Overall I am pleased with this text. **EALR 1** is addressed well showing how models for the structure of the atom developed over a long period of time. Limitations of each of these models are well presented. **EALR 2** is well covered using experiments and demonstrations that can be done in a classroom setting that can lead to a deeper understanding of the concepts. **EALR 3** is also well covered, with references to how the understanding of the "big idea" lead to the development of new technology that is useful for society as well as how technology can be used to further the understanding of the "big idea". **EALR 4** that is concerned with the fundamental properties of matter and how they interact with each other are well developed. The concepts that enable students to understand atomic structure, and the ability of atoms to form compounds are well presented. How the outcomes of a chemical reaction could be predicted is also well covered and assessment tools to ensure students' understanding of all the concepts in the "big idea" are well developed.

The supplementary materials are quite extensive and the main text refers to these materials where necessary and how to use them to enhance students' learning. For example there are separate supplementary materials for "real world chemistry projects", "laboratory activities focused on career oriented investigations", "supplementary practice problems", "forensics lab manual", "performance assessment", " challenge problems", "lab manual to accompany the text", "Chapter Review and Assessment", "Problems and Solutions Manual", "small scale lab manual", "Study Guide", "Critical Thinking and Problem Solving", "ChemLab and MiniLab Worksheets", and "Chemistry Enrichment" (supplementary readings). While no instructor will use all of these resources, it is wonderful that the publisher has provided these many options for the instructor to select from.

Publisher: Glencoe Science	**Program Name**: Chemistry: Matter & Change
Reviewer: Dharshi Bopegedera, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • This text covers all of the content required by the Washington State 9-12 Science Standards	**Weaknesses:** • This text reads very much like a college level textbook. While one can see this as a

• Important concepts that teach the "big idea" are developed starting from the easiest and moving in a logical sequence to the hardest • Uses a step by step process to analyzing a complex problems • The material conveys the purpose and the relationship of one lesson or unit to another • The material develops an evidence and inquiry based argument of the concepts • The historical development of the "big idea" is evident and shows clearly how the current understanding of the "big idea" was arrived at • The concepts are summarized at the end of each chapter as a study guide • Virtual labs are suggested for students to try on their own to understand concepts • Students/teachers are guided to do on-line searches to extend their classroom learning/teaching • Lab experiments are embedded within the text • Suggested quick demonstrations are provided for the teacher with the goal of enhancing concepts covered • vocabulary terms clearly stated • real world applications of the concepts students are learning are indicated • teacher is provided with suggestions for accommodating students with disabilities with specific experiments and activities they could do • Activities are suggested for advanced learners to help further their learning • Hands-on activities are provided for students who are below level to assist grasping concepts • Connections to mathematic are made often • Analogies (using simple, real life experiences of students) are used to convey difficult concepts • Suggestions are made for using household materials to teach complex concepts • suggestions are provided for identifying	disadvantage, the authors have tried hard to make it accessible to the high school audience by including examples from students' everyday life experiences. Personally I think this is a great way to help high school students transition to college level books.

misconceptions • Long-term project ideas are provided • Use of a "chemistry journal" to help students improve writing skills • information on careers in chemistry are provided • instrumentation (technology) is included as a necessary part of skill development • assessment is built in throughout the chapters as well as at the end of each chapter including standardized test practice and these support the sequential development of student conceptual understanding while informing instruction	
General Comments: Overall I am pleased with this text. **EALR 1** is addressed well showing how models for the structure of the atom developed over a long period of time. Limitations of each of these models are well presented. **EALR 2** is well covered using experiments and demonstrations that can be done in a classroom setting that can lead to a deeper understanding of the concepts. **EALR 3** is also well covered, with references to how the understanding of the "big idea" lead to the development of new technology that is useful for society as well as how technology can be used to further the understanding of the "big idea". **EALR 4** that is concerned with the fundamental properties of matter and how they interact with each other are well developed. The concepts that enable students to understand atomic structure, and the ability of atoms to form compounds are well presented. How the outcomes of a chemical reaction could be predicted is also well covered and assessment tools to ensure students' understanding of all the concepts in the "big idea" are well developed. The supplementary materials are quite extensive and the main text refers to these materials where necessary and how to use them to enhance students' learning. For example there are separate supplementary materials for "real world chemistry projects", "laboratory activities focused on career oriented investigations", "industrial chemistry processes and products", a manual dedicated to helping the instructor with "English Language Learners", "standardized test practice", "supplementary problems", "forensics lab manual", "performance assessment", "lab manual to accompany the text", "A handbook for solving problems" (this contains chapter review, extra examples and practice problems, vocabulary summaries and assessment for each chapter), "A complete solutions manual", "science notebook" (note taking tools for students), "small scale lab manual", and "Resources Manuals" (for the instructor). While no instructor will use all of these resources, it is wonderful that the publisher has provided these many options for the instructor to select from.	

Publisher: Kendall/Hunt	**Program Name**: Kendall/Hunt Chemistry
Reviewer: Dharshi Bopegedera, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • This text covers all of the content required by the Washington State 9-12 Science	**Weaknesses:** • vocabulary terms are not clearly stated in each chapter

Standards • Important concepts that teach the "big idea" are developed starting from the easiest and moving in a logical sequence to the hardest • Uses a step by step process to analyzing a complex problems • The material conveys the purpose and the relationship of one lesson or unit to another • The historical development of the "big idea" is evident and shows clearly how the current understanding of the "big idea" was arrived at • The concepts are summarized at the end of each chapter • Students/teachers are guided to do on-line searches to extend their classroom learning/teaching • Lab experiments are embedded within the text • Additional lab options are provided, sometimes from the Journal of Chemical Education (published by the American Chemical Society) • Group projects are introduced at the end of each chapter with options for writing papers, making posters, or oral presentations to the class • Writing is integrated as an essential part of learning chemistry • Real world applications of the concepts students are learning are indicated • House hold materials students are familiar with are used extensively to show the presence of chemistry in everyday life • On-line resources that enhance learning are provided by the publisher • Assessment is built in throughout the chapters as well as at the end of each chapter and these support the sequential development of student conceptual understanding while informing instruction • The text makes references to "Chem	• Students are asked to draw Lewis dot structures for sodium chloride (which is an ionic compound). This will lead to misunderstanding because Lewis dot structures are only used to show bonding in covalent compounds • Weak on inquiry based approach to communicating concepts • There are no suggestions for accommodating students with disabilities, advanced learners, or students who are below level • Interdisciplinary connections are not made • information on careers in chemistry are not provided • instrumentation is not included as a necessary part of skill development

Matters", a popular chemistry magazine published by the American Chemical Society specially for high school students and informs the instructor connections that can be made between what the students are learning in the classroom and resources from Chem Matters magazine • Concept maps are used throughout the text to convey how concepts are connected	

General Comments: **EALR 1** is addressed well showing how models for the structure of the atom developed over a long period of time. Limitations of each of these models are well presented. **EALR 2** is very well covered using experiments and demonstrations that can be done in a classroom setting that can lead to a deeper understanding of the concepts. Each of the chapters is focused on how the concepts in the chapter could shed light on everyday phenomena students are likely to encounter. In this way, students learn that chemistry is useful in understanding how nature works. **EALR 3** is not as well addressed. There is little connection to the exploration of how the "big idea" could lead to the development of new technology that is useful for society. **EALR 4** that is concerned with the fundamental properties of matter and how they interact with each other are well developed. The concepts that enable students to understand atomic structure, and the ability of atoms to form compounds are well presented. How the outcomes of a chemical reaction could be predicted is also well covered and assessment tools to ensure students' understanding of all the concepts in the "big idea" are well developed.
An added value in this text is the reference to Chem Matters magazine and drawing examples from experiments published in the Journal of Chemical Education. The earlier high school students are exposed to such literature, the more they will be willing to use primary literature in high school and beyond. I did not receive many supplementary materials (such as solutions manual, lab manual, students' study guide etc.) with this text except for a CD of test banks. I am not sure if such materials are available for teachers.

4.3.3 Earth & Space Science

Publisher: It's About Time	**Program Name**: EarthComm
Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: HS Earth & Space Science
Strengths: • Clear presentations of challenging ideas. • Activities short, but give opportunities for students to be inventive. • Everything is applied to students' own community. • Systems ideas kick of the course and are revisited throughout with the idea that whatever happens to Earth affects your community.	**Weaknesses**: • Some students might consider the cartoons a little babyish, though I think most students will enjoy them. (The cartoons always introduce a thought-provoking question.) • Laboratory activities could be somewhat more substantial. However, they do communicate the basic concepts. • Like all of the other instructional materials, the TG is huge! It's daunting. I'd like to see

• All content standards in ES1, ES2 and ES3 for grades 6-8 are included. • Very little extraneous material. It is a pretty good match to our standards. • Teacher's guide is extensive with tips on how to help the students design the lab activities, further background information, assessment rubrics, etc. • There are some images of various Earth scientists, engineers, and technicians related to Earth systems.	it slimmed down to essentials. • Profiles of Earth scientists, engineers and technicians are very short and sketchy. People's names are not given.

Description: Earth Systems Science in the Community (EarthCom) consists of a hardbound textbook (about 900 pages) five paperback Teacher Guides, one for each of the five units (total of about 3,000 pages), a Teacher Resources book with blackline masters and assessments (300 pages), and two disks: a Test Generator with over 1,000 questions from state and national standards and a second disk with color transparencies and blackline masters.

General Comments: All four EALRS are very well represented. Systems concepts weave throughout the book, and in a very interesting way—to illustrate how all earth phenomena are related to the students' own communities. Inquiry is encouraged by starting every chapter with a thought-providing question, and including an investigation in each chapter. Although the activities could be more substantial, they do encourage the students to be creative and thoughtful. Application is also strong, in that students are encouraged to think how earth phenomena impacts them. Students are asked to think about where their energy comes from, what kinds of threats their community faces from earthquakes, volcanoes, flash floods, storms, etc. and what causes these events. Content is well presented as the book is very well written and sequenced to build up student understanding gradually. Illustrations and photos are very good and not overly complex. There is math included but not so much that students who have difficulty with math would become frustrated too much of the time. Virtually all content standards are included with very little extraneous material. Most important is that the content is all made relevant to students' lives.

EALR1 Systems
The first unit introduces a fundamental systems concept in a very engaging way. Students envision how a volcano erupting on the other side of the world would affect their community. They write a story or screenplay about a volcanic eruption and gradually learn how Earth events are all connected. Students construct their own rubric for the assignment.

EALR2 Inquiry
Units start off with questions—great cartoon of a volcano erupting at a BBQ: Can volcanoes form anywhere on earth? Why or why not? Later in the chapter they use the USGS map Dynamic Earth to answer the question. Chapters are short, focused, and all begin with a question, and end with some type of challenge.

Activities encourage students to be inventive. Instead of telling students what procedure to use students are challenged to “devise a way to use these materials to measure the gas that escapes from a can of soda.” They also predict before making the measurement.

Very nice treatment of tides. It explains the bulge on the side of the moon, and says “It will probably seem strange that there’s a bulge of water on the side of Earth away from the Moon.” It does not answer the question there, but directs students to an “Inquiring Further” section. Also this is the first text I’ve seen that comments on why the tides lag behind the moon’s position, so we do NOT have high tide when the moon is overhead.

EALR3 Application
All units include some consideration of how the content relates to students’ own communities. This is especially true with the unit on land use, but all of the other chapters as well, by showing how Earth systems are connected, students see how natural events and human decisions affect their communities. There are major sections on coal, oil, gas, and other types of energy, and mineral resources, water supply and demand, all directly related to people’s lives. As one would expect, this is a very application-oriented program.

Units end with images of different Earth scientists at work—excellent images, but people are not named, and only one or two sentences on each.

EALR4 6-8 ES1 – Earth and Space Science —Solar System
This unit opens with relationship between astronomical events (such as asteroid encounters) affect people on Earth. Students use various scales to try and represent the solar system to get a sense of how much space there is in space (6-8 ES1B) . Students observe the moon in the sky for 2-4 weeks and model the moon phases with each student having their own “moon model.” Text explains position of Earth in solar system and of solar system within the Milky Way. Students learn about Earth orbits by drawing elipses and learn about Kepler’s laws but math is kept simple. The section on seasons is very carefully done (though not in our 6-8 standards).

EALR4 6-8 ES2 – Earth Systems, Structures, and Processes—Cycles
Sequences of chapters tackle major concepts one piece at a time. The series on tectonics begins by introducing the idea of a theory, then provides experience with density (layering liquids), convection, effects of tectonics, students simulate plate collisions, play the Pangea game, etc. Later units on earthquakes (make seismographs), shaping of landforms by erosion (stream table activities), rivers and drainage basins, etc. all related to students’ communities. Water cycle, rock cycle are well represented.

EALR4 6-8 ES3 – Earth History—Evidence of Change
Evidence is a common theme. For example one of the opening chapters on volcanoes begins with “What evidence would you look for to see if volcanoes have erupted near your community? Similarly, students look for connections between stream table results and local waterways. Evidence is emphasized throughout. The concluding unit is about fossils and Earth history.

Publisher: Glencoe/McGraw Hill	**Program Name**: Earth Science: Geology, the Environment, and the Universe
Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: HS Earth & Space Science
Strengths: • Starts out with overview of Earth systems and definitions of technology and nature of scientific investigation. • Most of the labs begin with a question and encourage students to formulate and test a hypothesis.	**Weaknesses**: • Although may judge all of these materials to be a strength, I found the amount of material overwhelming. • Key concepts in the WA standards are "covered" but the text is very dense. If students do not already understand these concepts it is unlikely they will do so from this textbook. • There are a huge number of pages in which students fill in blanks in response to what they read in the textbook. It seems like most of the students' time is spent filling in blanks. • Many of the labs are not on target to support the concepts. The sky observation astronomy lab, for example, involves making meridian-crossing time measurements rather than observing the moon's phases. •

Description: Materials consist of a Teacher's Wraparound Edition (1,000 pages), Textbook (which I did not receive, presumably because each page of the student text is included in the Teacher's Wraparound), Teacher's Annotated Edition of the Science Notebook (350 pages), Teacher's Edition of the Laboratory Manual (300 pages), Teacher's Edition of the Exploring Environmental Problems Lab Manual (100 pages), 8 separate Resource Books (60-150 pages each), a Laboratory Management and Safety manual, ELL Strategies for Science guide, and Performance Assessment guide. All-in-all it's nearly 3,000 pages, not including the student materials (which are presumably included in the above teacher guides. The **Notebook** provides worksheets for every section—problems to solve, mostly fill-in the blank from the textbook. The **Resources** provide additional worksheets for the same sections but with more detail, including mostly multiple-choice and matching activities. They also provide additional mini-labs to help students who need extra preparation—it provides scaffolding. Teachers are not expected to use all of these resources, but to pick and choose. **Performance Assessments** is a set of performance tasks and rubrics for assessing student abilities; but it's not clear it is related to the rest of the curriculum.

General Comments: This textbook starts out with a good overview of Earth and space science and of technology and nature of science, measurement, graphing, theories and laws. But the rest of the book is very densely-packed information. While all of the concepts in the WA standards are in there somewhere, they are buried in a huge amount of information. There are some 800 pages of study guides provided of the fill-in-the-blank variety. There are "standardized test practice" pages to see if the students learned the information in the text. However there are some bright spots. The story Wegner and tectonic theory is well-told, and some activities that go along with it deal with the phenomena of how continents fit together and magnetic materials on the sea floor. There is also a study method called "foldables" that help students take notes as they read the material, which will help with memorization of the content. Overall, however, the course is an example of the "mile wide and inch-deep" curricula.

EALR1 Systems: The textbook starts out with Earth's four systems: geosphere, atmosphere, hydrosphere, and biosphere, and asks students to think about how their interaction changes Earth. Beyond that, however, I did not find many cases in which the concept of systems was emphasized.

EALR2 Inquiry: Book starts out with pretty good overview of scientific investigations, emphasizing that there are many, not just one. Also gives overview of fields of Earth science. Defines controlled experiments, safety, and measurement, giving short definitions of mass, weight, density (warns teachers about misconceptions and suggests things to say to students to correct their misconceptions.) The labs in the "Laboratory Manual" are fairly open-ended in that that they raise a question, give a list of materials, and urge the student to formulate and test a hypothesis.

EALR3: Application. The book defines technology as application of science. Not exactly up-to-date but okay. However, I found very few references to actual applications within the remaining chapters, and no profiles of scientists or engineers except for a few historical figures like Alfred Wegner.

EALR4: 6-8 ES1 Earth and Space Science—The Solar System. After the first chapter remaining chapters are packed with information. 6-8 ES2, Earth Systems, Structures and Processes, seems well-represented, as was 6-8 ES3 Earth History, although there is quite a bit more information than in WA's focused standards. I used Unit 8 Beyond Earth, to see how well the content matched our Content Standards. This unit contains four chapters: 27 The Sun-Earth-Moon System, 28 The Solar System, 29 Stars and 30 Galaxies and the Universe.

Chapter 27 begins with the EM radiation that we receive from space, and how telescopes work, as well as space-based astronomy. That seems like a reasonable starting place. It then describes lunar explorations, the interior or the moon, and its formation and history. The next section describes daily and annual motion with a single complex diagram, and then spends two pages describing how the Earth's tilt explains seasons. Phases of the moon are illustrated with a complex diagram, then synchronous rotation, tides, solar eclipses with very complex drawings. It ends with a nice lab about finding relative ages of lunar features. The lab that goes with this chapter involves measuring the times that the moon transits the meridian, which is a nice astronomical measurement but unrelated to the content of chapter 27. Chapter 28 is packed with astronomical information about formation of the solar system, Kepler's laws, quantitative calculations of the forces of gravity, and so on. Chapter 29 is concerned with the interior of the sun and the process of fusion, calculations of distances between stars and the HR diagram of brightness vs. luminosity, the evolution of stars, and

details about different evolutionary paths. Chapter 30 concerns classification of galaxies, how their distances are found and their distribution in the universe, the Big Bang theory and alternative models of the future of the universe. Certainly all of the content statements from the WA standards in 6-8 ES1 are included, but they are presented very densely with poor illustrations and a lot of extraneous information. If students do not already understand these concepts it is unlikely that they will do so from this text. EALR4 ES2 Earth Systems, Structures and Processes— Cycles and EALR4 ES3 Earth History— Evidence Content is very similar to first ES set of content statements. Very densely packed, too much information, focus on memorization and filling out worksheets.

Publisher: Holt, Rinehart, and Winston	**Program Name**: Holt Earth Science
Reviewer: Cary Sneider, Ph.D.	**Grade Level/Course**: HS Earth & Space Science
Strengths: • Colorful illustrations. • Might serve as a high school freshman course that combines physical science and Earth science. • Nice introductory chapter with factual information about the nature and process of science. • Good introduction to systems in an early chapter • Good warnings about possible misconceptions.	**Weaknesses**: • The text is far too dense, includes too many extraneous topics, diagrams that are overly complex and difficult to interpret. • Lab activities are cook-book and confirmatory type. • Almost no applications of science. • Introduction to systems in early chapter not well carried through in rest of book
Description: One teacher's guide (950 pages), 30 Chapter Resource Files containing worksheets, assessments, datasheets for labs, answer keys and transparency masters. (range from 40-125 pages for a total of about 2,000 additional pages). Also Holt Science Skills Workshop: Reading in the Content Area, which uses a lot of Earth science content but does not appear directly related to this curriculum (185 pages plus about 100 transparencies) and Laboratory Manager's Professional Reference, also not directly related to the curriculum (150 pages) In all there is about 3,500 pages here for teachers to use. **General Comments**: The text is very dense and packed with factual information about science. The labs, on the other hand, fall well below the inquiry standards for grades 9-11 in Washington state. Use of this text would lead to students spending most of their time memorizing information that is	

not in the standards, spending some time with labs that are unlikely to result in the kind of learning called for in our standards, and almost no time actually engaged in inquiry and design activities.

EALR1 Systems. The concept of Earth as a whole system, uniting the various fields of Earth science, is introduced in Chapter 2. Included are open and closed systems, the four "spheres" of the planet, and the nitrogen, carbon, water, and phosphorus cycle, as well as human interaction with Earth systems and energy flow through food webs. However, I don't see that students are given time to analyze complex situations using systems tools.

EALR2 Inquiry. Although there's a nice introduction to nature of science, a (note the) scientific method, the labs are very regimented cookbook confirmation labs, such as "Testing the Conservation of Mass." In one lab, about Earth-Sun motion, students are told to build an apparatus shown in a picture of a vertical stick in a board, with a piece of paper, and to "Brainstorm with your partner a way in which you can use the apparatus in an experiment to measure the movement of the Earth for 30 minutes." In other words, the labs are cognitively at a very low level.

EALR3 Application.
Examples of applications are relatively rare, but there are some. For example, there is a small paragraph in Chapter 26 on "Spinoffs of the Space Program." No technological design and almost nothing on careers. Seasons is explained with a diagram and two paragraphs and a "Quick Lab." It is unlikely students could get much from this, and it too is at a high school level.

EALR4 9-11 ES1 – Earth and Space Science —Evolution of the Universe
My most detailed review was Unit 8, Space, which includes five chapters: Studying Space, Planets of the Solar System, Minor Bodies of the Solar System, The Sun, and Stars, Galaxies and the Universe. This chapter does include everything in our standards for the HS level, but it also includes a great deal of other material. Seasons, which is a difficult concept at the HS level, is covered in just a few paragraphs with an illustration know to support misconceptions.

EALR4 9-11 ES2 – Energy in Earth Systems
There is a lot of detail in this book. Earth materials is introduced with a chemistry chapter, on the periodic table, valence electrons, chemical equations and formulas, so that this book might be used as a combined Earth Science and Physical Science course. Chapter on minerals include crystal symmetries, which is interesting but not in our standards.

EALR4 9-11 ES3 – Earth History—Evolution of the Earth
Nice presentation of history of Earth sciences, e.g. Hutton and uniformitarianism, and covers topics in the 9-11. Thorough coverage of absolute dating using decay of radioisotopes.

4.3.4 Integrated

<table>
<tr><td>Publisher: It's About Time</td><td>Program Name: Coordinated Science</td></tr>
<tr><td>Reviewer: Janet F. Ott, Ph.D.</td><td>Grade Level/Course: HS Integrated</td></tr>
<tr><td>Strengths:

Engaging material – units (15) each organized around an involved challenge
Very interactive – student is asked to test everything, and asked to come up with their own experiments
Students are engaged in creating criteria for assessment of final projects
Organized around big projects that demand understanding of Big Ideas and concepts involved in them
Challenge brings together all the material learned in the unit
Activities all extremely well tied to major concept being learned and to each other; a variety of activities are used, from questions, labs, thought experiments, discussion, writing, video production and cooking
Nearly every activity was tied to something the student could relate to in their own life; every challenge certainly was
Concepts get revisited regularly and are used in a variety of ways; students could easily internalize the material and transfer it to other fields
Careers and how the concepts get used in the real world were visited often. Most questions came not from the theoretical, but from experiences
</td><td>Weaknesses:

Not truly integrated across fields; each field given its own section of the text
Topics not laid out linearly so not easy to find individual concepts
Chemistry has less material (3 units) than physics (6) and earth science (6)
Ties to history rather limited
</td></tr>
<tr><td colspan="2">General Comments: This is not truly coordinated study. The text is laid out in three segments of physics, then chemistry, then earth science. They do not cross disciplines in that way. The chapters are the same in Physics and Chemistry as in their Active Physical Science text. What they have done is decrease the number of Physics and Chemistry chapters so as to include Earth Science. It is material to be covered in one year. Given that, much of my commentary is reiterated from the other textual material.
As I looked at the introductory material, I couldn't wait to open the text. I was not disappointed. This material should not even be compared to the others; it's so far beyond their league. From page one, this text is engaging. Students couldn't possibly ask, "why should I care?" Every activity is not only related to the very engaging challenges, but also taken from the real world and their own lives. The first chapter has them auditioning for a spot as a PBS sportscaster whose job it is to teach the physical principles used</td></tr>
</table>

in the sport they are covering. In the chapter, the activities explore acceleration, vector analysis, center of mass (and how the Fosbury flop allows the center of gravity to be below the bar), shoe friction, collisions, and Newton's laws among others. Because they are tied to the challenge and going to be used in their final product, for which they have helped determine the criteria for assessment, they are instantly brought into wanting to learn. The activities are many and various, and the reading is tied to the material and to the real world. Students could immediately see the kinds of careers they might engage in and how they would use the material being learned.

Other challenges were equally engaging – creating safer cars, creating a roller coaster, designing a universal dwelling, creating special effects for a movie, and creating a set of articles for the newspaper about global warming and the climate issues involved for their community are some of the others. Who wouldn't want to learn the necessary skills? Even many of the questions to get them to understand the principles were engaging – test, using video and time lapse, whether a basketball player actually "hangs" when dunking the ball. And because the other, more mundane, questions were all about gathering data necessary to answer the more engaging questions, student saw the need to learn it by doing it. Students may find the earth science particularly involving because so many of the examples are taken from the Pacific Northwest. They focus on volcanoes, and use Mt. St. Helens, Mt. Rainier and the entire Cascade region for several examples.

Students were constantly put in small groups and group work assessment and choosing of roles were part of the process, so they were learning cooperative learning and how to structure their own achievement at every turn. Their social skills, and study skills could not help but develop as they negotiated what had to be done and how they were going to split up the work.

More than most of the other texts I saw for this level, this material gets to the heart of what the WA State science standards are about. The material conveys the purpose of every unit and every activity is strongly tied to the whole and builds on one to the next. They use multiple and varied phenomena to support the conceptual learning, and more importantly, these are taken from real life that the students can strongly relate to. They demand evidence-based arguments, specifically for the student to not just learn, but embody the concepts. Assessment is strongly build into the system, and more, engages the students in its creation, so the students have buy-in to that assessment. They use a limited number (15) of challenges to get to the Big Ideas. Because they are tied to a structure that the student is helping to create, the learning is learned more cohesively, and remembered better because of that structure. Also, because the questions are asked of varying fields within the area (various winter and summer sports for the first challenge), they are able to take the concept and learn to apply it elsewhere more easily than from a purely theoretical approach. (They're given six different scenarios; they could easily fit it to a seventh or eighth.) Though history was not strongly developed, when they used historical examples, they develop how the idea came to be. The culminative project at the end of every unit brings summary and closure the concept. This also sees to the issue of communication skills. The students produce a product rather than give short answers to questions.

EALR 1 B, C, and D are well covered. They have the student look at several systems at once. They need to model to simplify the large task they are being asked to tackle. They also look at several inputs at once (if two people kick a soccer ball at the same time, for instance) and at what that output is. Since the ball is still in play, the first vectors become an input for the next actions. However, feedback (**EALR 1A**) is not covered well, though they reference it in their materials. It doesn't even show up in the glossary or index. While **EALR 2** is at the heart of most Physical Science books, here it is in spades. Not only do the students do all the smaller activities that make up the unit, but they also put it in action in a

large self-determined project that has a report or audio or video production component. They do what happens in the real world and are critiqued on criteria they helped determine. They are asked to question, investigate, explain, and model throughout a unit. They need to communicate clearly with both their team throughout the process and with the other students and teacher with their product. It was the only set of materials that did this task so completely and engagingly. **EALR 3** was developed far more strenuously than I saw in any other material I evaluated at this level. Nearly every task they did, and all the challenges were from real world examples, using technology as well theoretical science. They were asked to not just choose, but also determine, what the best solutions were to very complex issues (the best universal dwelling). Every part of the application process was covered. The **EALR 4's** for both the physical and earth sciences were all embedded in the challenges and questions and activities to do those challenges. Though they were not as neatly laid out as they were in other texts, they were all there, and used and tested within contexts that the students not only could relate to, but would grasp as important and interesting. Overall, this ambitious set of materials covers a lot of ground well, and quite thoroughly. It may be a bit much for one year's coverage in terms of shear amount of material.

Publisher: BSCS (Kendall-Hunt)	**Program Name**: Science: An Inquiry Approach
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: HS Integrated
Strengths: • Use an integrated approach to science • Total inquiry approach – very thorough in that • Very good use of analogies to understand concepts • The "Putting it all together" sections asks students to recall information from other chapters, e.g., in astronomy speaking about patterns that astronomers look for, recall patterns that Hooke found in cells and Mendeleev found in element characteristics • Students are asked to create chapter organizer to help get "the Big Idea" • They use writing explanations to others to solidify understanding • They have them learn from their mistakes by taking their last test, and redoing the questions, or changing their answer from written to visual (e.g., a graph). They can earn extra points for doing it well. • The historical stories actually explain how the scientist came to the conclusions and	**Weaknesses**: • The material was often confusing and hard to keep the main idea of any one chapter or unit straight. The concepts and activities were not well tied together because there were few overarching themes. • The material often jumped from one topic to another. In just a few pages, they speak of early life on earth, meteorites, molecular models and carbon as diamond and coal. Yes, it all ties together, but they do not make it obvious. They leave it to the student, without strong guidance. • The student study CD was appallingly simplistic

ideas that they did (unusual in the material I reviewed) • The teacher's guide is a wrap-around text and has carefully crafted and useful activity and question guidance	

General Comments: This material is designed for use in a several year program. The school that adopts it will radically change its science format because it covers Life Sciences, Physical Sciences and Earth and Space Sciences over the course of at least two years in a two volume set. The material is organized in 4 major units per year – Matter, Machinery of Life, Earth and Beyond, Perspectives on Science and Technology in Your World (crime, risk, fire) in the first year; Interaction (physics and chem.), Inside life (evolution & genetics), Moving Mater (cycles), and Sustainability in the second. It is an impressive range of concepts covered. The material aims high but misses the mark to some degree. They use inquiry extraordinarily well. And integrated material is often the best way to understand concepts, by having a framework to hang it all on. The missing is in the overarching themes of each unit. Though they state a theme, what's missing are the ties from one to the other concepts they use to exemplify the concept, and also some challenging question, complex issue, or challenge throughout that pulls the material together. So the material in each chapter felt disparate rather than related, and the activities were useful, but not explicitly integrated into one another. The activities, especially, often seemed isolated, rather than well connected. They certainly use multiple and varied phenomena to support the conceptual learning. And they do have "Putting it all together" sections that have some good integrated questions for the student, so they start the process. It just would be much stronger with some complex societal issue or challenge that connected to the student to some larger structure. There were no cumulative, or culminating projects that would do that. Given there were only four units per year, there is a perfect opportunity for that.

Be that as it may, they do some things extremely well. They had the very best exploration of density (a concept often difficult for students to grasp) seen in any of the materials I reviewed. They set up liquids of different density in a column, and had them drop in different solids to see in what liquid they would settle. They revisit the issue with a Galilean thermometer later in the book. Other analogies were as easily grasped for other complex issues. On the whole, they used better analogies for many concepts than any material I reviewed.

They use an Inquiry approach from the beginning. The material is far more about how to test and learn and form ideas and hypotheses based on evidence than rote memorization or reading and questions (there were no "set of questions" at the end of each chapter. They address early on, and revisit regularly, how to formulate good questions, how to test and modify that test if there was not definitive answer. They explore what assumptions are and how to not make them. For instance, in the first chapter, they test sports drinks. They test what is in it, not just the solutes, but they include the solvent – it is water? How would they know? The material is very thorough in conceptual development of how to use inquiry, what real evidence is, whether the conclusions they are making are evidence-based or inference, and have a couple of wonderful interviews with scientists that addressed that issue (Mary Leakey's was especially good in that regard).

They, more than other materials I reviewed, had the students thinking deliberately about the world. They stressed small groups, working together, participation, communicating their ideas to others, and that wrong answers or mistakes are not bad (ideas and unexpected products have come from them, and learning does as well). They were the only company that used wrong answers on a test to a deliberate

learning opportunity. Assessment material is separated from the book – there are no set of questions at the end of each chapter to deliberately grasp each concept, though there are reflection questions that get at some larger issues. Assessment is in the Teacher's Test Bank and any papers or reports that s/he might require. Less than some other material, they do not incorporate assessment embedded and integrated into the materials. The student study CD's were some of the most simplistic and redundant I've seen. There were no interactive pieces that I saw (though I may have missed them). Most were diagrams slowly loaded into an Adobe reader that they already had in the book. Either I was missing something essential or it's not very useful. Given the large scope of this material, a real issue is "are the EALR's covered?" In **EALR 1**, as a whole, the integrated science materials did a much better job on feedback (**SYSA**) as whole that I saw elsewhere. However, it is still slim in coverage, as is equilibrium (**SYSD**). They use feedback not just in systems, but in their own work – feedback after doing an experiment – how to improve, what to change, etc., also using their tests as feedback as to their own learning, and how to change for the next time. Certainly, given the scope of the material, **SYSB and C** are well covered and modeled. **EALR 2** is extraordinarily well covered, and is consistently discussed and refined. **EALR 3** is less well developed than could be expected given the material's scope. Most topics were discussed in relative isolation rather than in context. Student experiments were applicable to the immediate material, but did not consistently build on one another, nor did they lead to any culminating project or concluding ideas about the unit as a whole. "Big projects" looking at complex societal issues were not studied in depth in the sections I read. This material had the perfect opportunity to do these types of activities, but did not take them. **EALR's 4** are the most difficult to analyze in this material because the information is sprinkled throughout the books. I will discuss Newton's Laws, Energy in Earth Systems and Processes within Cells. Newton's Laws (**PS1A-H**) is covered thoroughly and well, and use a combination of physics, chemistry and astronomical phenomena to explore them. They are covered extensively in the second volume. Energy in Earth Systems (**ES2A-D**) is covered, though some fairly obvious conceptual conclusions are not drawn – global warming is not discussed at all, and there is only one sentence describing the relationship between seasonal temperature variation and radiation from the sun. Variations of carbon are discussed, but not as reservoirs, though its cycle is a whole exercise, and the water cycle is discussed as well. Resources as a whole are discussed. The complexity of interactions about them was not explored strongly. Processes within Cells (**LS1A-H**) is much more thoroughly covered, and every aspect of is discussed in a fair amount of detail, and explored in several activities. Overall, this set of texts covers the Physical and Life Sciences extensively and in an inquiry-based mode. They aim for ideas tied into large units. The only real difficulty is that there is no overarching theme and the activities are generally separate and unrelated to one another, except superficially – there is no unifying idea or project. Further, there is no real building toward something larger than can hold the whole set of ideas together.

Publisher: LabAids, Inc.	**Program Name**: Science and Sustainability
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: 9-12
Strengths: • Units connected concepts strongly one within each unit, and among the units where appropriate, using sustainability	**Weaknesses**: • Several EALR 4's are not well addressed • Students may come out of the program not sure of what exactly they learned in terms

throughout. • There are only four units (survival needs, feeding the world, earth's resources and fuel issues) covering large issues and • Used real world examples that tied across units, using the supplementary text, Material World by Peter Menzel • The activities relate well to one another and are generally taken from real world issues that students can relate to – population, global warming • There is continual analysis and having the student test, and actually design experiments, to grasp the Big Ideas • There is a logical sequence for each Big Idea, with one concept being built on another, and being tied together from one major unit to another – the first unit on survival gets explored even more deeply in the other units • The material helps students draw their own appropriate conceptual connections, while having them see the complexities of making choices among disparate and sometimes opposing characteristics – there is no "right answer" • Each task is tied to the concept and uses very different methods to discover concepts for themselves – labs, discussions, role playing, letter writing, reports to officials. Tasks get increasingly complex and address larger issues as the unit progresses • Cycles are strongly covered – where our waste goes – food, energy, material - is an issue they revisit several times	of physical and life sciences
General Comments: This is a very different program. The school that adopts it will be aiming for very different goals than checking off lists of EALR's. This material is the ***only truly integrated*** science material I saw in the material I reviewed. LAB-AIDS has picked an important major theme – Sustainability – and used it throughout the material. There are only four major units. The first, Living on Earth speaks to sustainable living, having the students compare, using Material World, possessions in four vastly	

different countries and work with them about which possessions are necessary for life, which not, and go on throughout the unit to look at issues of food, temperature and energy transfer, insulation and population dynamics. Throughout, they compare other cultures and regions and how each uses energy, food, etc. The second unit, on Feeding the World, looks at food production, nutrients, cell structure and function, elements and compounds, photosynthesis and genetics to look at crop breeding and genetically engineered food. The third unit, Using Earth's Resources, studies hydrocarbons, polymers for clothes, metals, by-products of materials production, catalysts, enzymes and reaction rates, degradability of material, food preservation, refrigeration and the tradeoffs of material use. In the fourth, Moving the World, they look at all manner of fuel, reactions, energy, energy use, trade-offs and end the year looking at global perspectives on sustainability. I spend this time on description, because it is not easily explained otherwise. In each unit, they use activities that build one on the next, to explore the concepts and tie them together and back to the main theme. Material World, for those that don't know it, is a pictorial vision of what typical households of the world have in their possession and a bit about their culture and daily life. It is brilliant supplementary material to have the students understand how their lives are different from the rest of the world, and how the use of energy, food, and material anywhere affects us all everywhere. They go back to the book regularly to pull out statistics to use. Truly the students are getting real world examples, real world problems to explore and a view of themselves as global, not just community, residents, and the implications of all of their actions.

Further, Stella, an environmental modeling system, is offered as well. Though the school can get by without it, the use of Stella can greatly enhance student's understanding of systems, inputs and outputs, subsystems effect on the whole, etc. Usually only found in college computer labs and in organziations that use modeling, this is a brilliant addition. Simple to program once understood, it can enhance learning, the use of models, and trial and error with different inputs.

The goals of this material are very different than most physical science materials. Here, students would be ready to tackle real world problems in a collaborative, engaged environment. They would have learned how to find what they need to know and where to find it, how to test, retest, and analyze results, how to work together, how to learn from smaller tasks to tackle larger ones, how to transfer learning from one area to another, and how fields of study are not isolated, but always intertwined. This is not amoral education. This is material looking at the world's current problems, and calling (albeit subtly) the students to action. They could not complete this set of labs, writing exercises, role playing, and comparisons, and not come away with a sense of needing to do something, if only increasing the recycling and decreasing water and energy use in their own home. I reiterate: the school that adopts this is going for very different goals for student learng; in my mind, far loftier goals than those of most material geared for this educational level.

To get to the nitty-gritty, let's look at the EALR's. There is no question that **EALR 1** is covered well. Using Stella and the activities themselves, students will come away with a thorough understanding of systems, subsystems, how different systems interlink, how complex everything really is, and what equilibrium is, in population, in water cycles, in energy and in food. **EALR 2** is also thoroughly done. The whole idea of the material is inquiry. Not just inquiry-based (though it is), but the full range of how scientists and technologists work. They generate questions, they evaluate them, they investigate, they review results and refine the experiments, they learn evidence- versus inference -based conclusions, They use models, and generate testable predictions, and finally, they are called to present to their peers their work. They work both in the theoretical and the physical problem-solving (technological) world. And more than any other material I saw, they apply (**EALR 3**) their findings. No other material uses real world material to the effective level that this material does in this arena. They look at cultures, investigate real issues facing the world today, work collaboratively, have to choose the best solution from a set of incredible complexities affecting the question. They use a variety of mathematical and scientific processes to solve those problems and have to incorporate trade-offs and model those into their solutions. Again, more than other materials, they will understand how their answers could be used to affect public-policy. They are asked, in a few places to offer to local administrators, solutions to issues facing them. **EALR 4** is where some will find this material to fall short. It does not cover every issue, nor are the concepts laid out in a neat sequence. Though Newton's Laws are covered (**PS1A-E**), gravitation, and electromagnetism (**PS1F-H**)are not. Atoms, molecules, and elements (PS2A-C) are introduced, and compounds, reactions, solutions, temperature change, radioactivity and nuclear reactions are (E-K) explored. Ions are not. And the depth is less than one would find in a Physical Science book for this level. But the material is intimately tied together, and students are encouraged to learn further on some topics. Energy transfer, transformation and conservation is there, but in a minor way; kinetic energy is not defined and gravitational energy is not covered. Earth and Space Science is not introduced. Processes within cells (**LS1A-F and H, I**) are all covered and integrated well. Gene expression is not. Ecosystems are explained well and integrated thoroughly into the material, the ideas of the book resting on the concept that we are all part and parcel of our ecosystem and that there are local and global ones. Mechanisms of evolution is introduced in terms of crop development and genetically engineered food.

I detail the above to give a thorough coverage of what and what is not dealt with in the material, so the choosers are clear – EALR's 1, 2, and 3 are covered intimately and thoroughly, and the heart of this material. Content, as in all integrated studies, has been compromised to gain the different goals I outline above. Students taking this course will learn how to learn, how to work on teams, and be prepared for advanced material in ways far superior to those who have memorized a lot of equations and learned a lot of facts. These students will truly embody the material and carry those lessons forward into their own lives. These will be trained to be the creative thinkers we need in the world today.

4.3.5 Physical Science

Publisher: It's About Time	**Program Name**: Active Physical Science
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: HS Physical Science
Strengths: • Engaging material – units (12) organized around an involved challenge • Very interactive – student is asked to test everything, and asked to come up with their own experiments • Students are engaged in creating criteria for assessment of final projects • Organized around big projects that demand understanding of Big Ideas and concepts involved in them • Challenge brings together all the material learned in the unit	**Weaknesses:** • Topics not laid out linearly so not easy to find individual concepts • Chemistry has less material (4 units) than physics (8) • Ties to history rather limited

• Activities all extremely well tied to major concept being learned; a variety of activities are used, from questions, labs, thought experiments, discussion, writing, video production and cooking • Nearly every activity was tied to something the student could relate to in their own life; every challenge certainly was • Concepts get revisited regularly and are used in a variety of ways; students could easily internalize the material and transfer it to other fields • Careers and how the concepts get used in the real world were visited often. Most questions came not from the theoretical, but from experiences	

General Comments: As I looked at the introductory material, I couldn't wait to open the text. I was not disappointed. This material should not even be compared to the others; it's so far beyond their league. From page one, this text is engaging. Students couldn't possibly ask, "why should I care?" Every activity is not only related to the very engaging challenges, but also taken from the real world and their own lives. The first chapter has them auditioning for a spot as a PBS sportscaster whose job it is to teach the physical principles used in the sport they are covering. In the chapter, the activities explore acceleration, vector analysis, center of mass (and how the Fosbury flop allows the center of gravity to be below the bar), shoe friction, collisions, and Newton's laws among others. Because they are tied to the challenge and going to be used in their final product, for which they have help determine the criteria for assessment, they are instantly brought into wanting to learn. The activities are many and various, and the reading is tied to the material and to the real world. Students could immediately see the kinds of careers they might engage in and how they would use the material being learned.

Other challenges were equally engaging – creating safer cars, creating a roller coaster, designing a universal dwelling, and creating special effects for a movie are some of the others. Who wouldn't want to learn the necessary skills? Even many of the questions to get to understand the principles were engaging – test, using video and time lapse, whether a basketball player actually "hangs" when dunking the ball. And because the other, more mundane, questions were all about gathering data necessary to answer the more engaging questions, student saw the need to learn it by doing it.

Students were constantly put in small groups and group work assessment and choosing of roles were part of the process, so they were learning cooperative learning and how to structure their own achievement at every turn. Their social skills, and study skills could not help but develop as they negotiated what had to be done and how they were going to split up the work.

More than any of the other texts I saw for this level, this material gets to the heart of what the Wa. State EALR's are about. The material conveys the purpose of every unit and every activity is strongly tied to the whole and builds on one to the next. They use multiple and varied phenomena to support the conceptual learning, and more importantly, these are taken from real life that the students can strongly relate to. They demand evidence-based arguments, specifically for the student to not just learn, but embody the concepts. Assessment is strongly build into the system, and more, engages the students in its creation, so the students have buy-in to that assessment. They use a limited number (12) of challenges to get to the Big Ideas. Because they are tied to a structure that the student is helping to create, the learning is learned more cohesively, and remembered better because of that structure. Also, because the questions are asked of varying fields within the area (sports for the first challenge), they are able to take the concept and learn to apply it elsewhere more easily than from a purely theoretical approach. (They're given six different scenarios; they could easily fit it to a seventh or eighth.) Though history was not strongly developed, when they used historical examples, they develop how the idea came to be. The culminative project at the end of every unit brings summary and closure the concept. This also sees to the issue of communication skills. The students produce a product rather than give short answers to questions.

EALR 1 B, C, and D are well covered. They have the student look at several systems at once. They need to model to simplify the large task they are being asked to tackle. They also look at several inputs at once (if two people kick a soccer ball at the same time, for instance) and at what that output is. Since the ball is still in play, the first vectors become an input for the next actions. However, feedback (Earl 1A) is not covered well, though they reference it in their materials. It doesn't even show up in the glossary or index. While **EALR 2** is at the heart of most Physical Science books, here it is in spades. Not only do the students do all the smaller activities that make up the unit, but they also put it in action in a large self-determined project that has a report or audio or video production component. They do what happens in the real world and are critiqued on criteria they helped determine. They are asked to question, investigate, explain, and model throughout a unit. They need to communicate clearly with both their team throughout the process and with the other students and teacher with their product. It was the only set of materials that did this task so completely and engagingly. **EALR 3** was developed far more strenuously than I saw in any other material I evaluated at this level. Nearly every task they did, and all the challenges were from real world examples, using technology as well theoretical science. They were asked to not just choose, but also determine, what the best solutions were to very complex issues (the best universal dwelling). Every part of the application process was covered. The **EALR 4's** were all embedded in the challenges and questions and activities to do those challenges. Though they were not as neatly laid out as they were in other texts, they were all there, and used and tested within contexts that the students not only could relate to, but would grasp as important and interesting.

Overall, all I can say is "Wow." I'm ready to volunteer in the classroom that uses this material. It was that fun and interesting.

Publisher: CPO Science	**Program Name**: Foundations of Physical Science
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: HS Physical Science
Strengths: • Appropriate level of detail in material across the units • Appropriate number of Big Ideas – 8 units • Coordinated activities that connect with each other well	**Weaknesses**: • Typical textbook – reading, with review materials at the end • Led by the hand. Little offer of them figuring out "How to" before giving them the answer, especially in labs

• Repeated skills and concepts across units • Challenge questions from the teacher and in book address issues found at home and in their lives • Key issues fro each chapter set in questions at the beginning • Easy to read – larger concept denoted on the left. Also easy to find information because of that • Key vocabulary given in boxes when first introduced • Mini experiments offered while reading • Offer sample problems before having them try. • Review for each section, though typical for most texts, is laid out well. The major concepts are re-examined with questions, vocabulary is reviewed, the concepts as well, and the problems are appropriate to the level learned. • A variety of ways to study the material is offered in the teacher guide – journaling (writing to understand), taking material to their local community (water conservation in town), as well as the usual questions and labs.	• History is not well covered, or integrated. The men (Marie Curie was the only woman mentioned) who discovered things were not spoken about or how they found out what they did. Only their discoveries were discussed • "The Real World" is not well integrated. Occasional pages are devoted to applications, but is not integrated throughout • Group work, active discussion of material, and practice with others of skill or concepts are not integrated into the text • Limited summary or closure to the concepts at the end of a unit
General Comments: This is a "perfectly fine text." Its very traditional, though laid out extremely well. Ideas flow from one to the next in an orderly fashion, and the activities are tied nicely with one another. It's extremely easy to find material within a section – topics are headlined, with subtopics in subheadings and each paragraph's idea in noted in bold at the left. Vocabulary is bolded in color and defined on the right. The Teacher's Guide is very well laid out, with good activities to get at each concept and tie them together and to the real world. There were a variety of suggested activities, including writing for understanding, some brief research projects, tie-ins to home and community. The Big Ideas are developed with evidence-based arguments in a logical sequence, and attention is drown to conceptual connections. Appropriate skills (graphing, alegra, measurement, repeatability) are practiced over and over. Concepts (e.g., forces) are recovered where appropriate. These applications of concepts and skills are taken to other fields to some degree, discussing water conservation and the acids and bases one might find at home. But there were no transformative tie-ins to the world, or using skills to look at complex issues such as life cycles of materials and how to mitigate the effect on the world (making computer components and recycling the materials, for instance), or using the analytical skills for practical purposes in the home (how to improve energy use at home overall – they do discuss the difference in light bulbs, but not the complexity of issues that come with them – just their differences in electrical use).	

Labs are set to explore bigger ideas. But they "give the answer" right away without letting the students explore the concept for themselves. For instance, in "how thick is aluminum foil, they don't have the students explore how they might get the answer, given the material they already know, by asking guiding questions, or offering that the teacher do that, they just have an experiment laid out to come to the answer. Same with figuring out a metal's mass with a scale. Having just studied specific heat, they could lay out questions to guide them to that concept; rather, they just give the experiment. Further, in neither of these, nor in other experiments, are the Big Ideas re-explored at the end of the experiment with larger challenging questions, or applications to other fields. In other words, they never answer the "Why should we care?" question that students inevitably ask.

There are some minor applications to other fields offered in the teacher guide, for instance, in the section on acid/base, the idea of acid rain is discussed. However, the obvious discussion of batteries and acids and bases, since batteries are used so extensively in their experiments and discussions in the text, it would seem a perfect place to tie in acid/base chemical energy to the electrical energy it provides.

History is given very short shrift. Poor Newton gets only one line, and Galileo, Bohr, and Einstein are spoken about only in light of their contributions, and nothing about how they arrived at conclusions. Even the sidebars are limited in scope. Marie Curie gets her own box, but little about how she came to conclusions. Only that she coined the phrase "radioactivity."

EALR 1 is not well covered. Feedback is only mentioned once, and is not in either the glossary or index, and systems and their complexity are not well covered, per se. They so speak about, and use models at every turn, including a very interesting nuclear model that clearly shows energy levels of electrons. They have a game to made atoms using different colored marbles for protons, neutrons and electrons that really got to the point. They have a kind of scrabble game to make compounds. They use little "energy cars" and photogates throughout to study forces and motion, velocity and acceleration. **EALR 2** is covered because they certainly use investigation, however, I saw little of the students being asked to generate their own questions or evaluate the questions of others. **EALR D-F** is covered in the chapters about how science is done, but not revisited. Students are not asked to make their own hypotheses and test them, or incorporate what they are learning into what they already know. **G and H** are missing simply because this is a question-based, not inquiry-based set of material. **EALR 3** is less well developed. Context is rarely considered, technology is mentioned, but not developed throughout, careers are not often suggested and there is little connection, except in isolated incidents, to the real world. Rarely do they discuss the issue of complexity in determining a solution. **EALR's 4** are all covered completely in their theoretical form and the students could do all the tasks asked at the end of the term, if they applied themselves to the reading and the tasks.

Overall, this is, as I said, a perfectly fine text. Students will get the material, understand the concepts well, and learn how to "do" what they need to do. What they will not get is any connection to how the discoveries they are studying were found in the first place, what the impetus was to learn them, or the impact they had on society. They will not easily transfer the skills or concepts to other areas of their studies or lives, because they are not practiced in the materials given, except in isolated cases. Nowhere in the text or teacher's guide, are they asked to look at complex societal issues using the skills and concepts studied.

Publisher: Holt McDougal	**Program Name**: Holt Physical Science
Reviewer: Janet F. Ott, Ph.D.	**Grade Level/Course**: HS Physical Science
Strengths:	**Weaknesses**:

• Appropriate level of detail • Coordinated activities that were well connected. Activities in the book. • Good supplemental material, including supplementary labs connected to forensics, math skills, reading skills and material in Spanish. They had a wonderful book with articles by top teachers about topics teachers should care about – gender equity, how to engage uninterested students, etc. • Challenge questions through the chapter, often with tie-ins to real world issues • Tie-ins to how the material would be used in the home, such as listing ingredients in food for the day and figuring out compounds; also community ties • Tied to careers using both chemistry and physics showing how disparate careers incorporate the material • Ties to other fields – nanotechnology to make circulatory "subs," mercury in fish traveling up the food chain • Pointing out common misconceptions at the beginning of the chapter in the Teacher's Edition to be on the lookout for difficulty • Review was thorough, and included vocabulary, key concepts, critical thinking, skills, as well as standardized test prep • They test using the usual Q and A, also test reading and comprehension, as well as analytical skills • Throughout they point out how to organize material for better study – fold-notes, diagramming techniques • Labs are not all theoretical. Some relate to real world examples looking at complex conflicting issues, such as turning up the temperature in summer at a bottling plant to save energy and it's effect on carbonation • Acid/base examples were real world	• Same number of topics as others reviewed but organized in singular topics rather than larger units – 18 in all. So it's harder to see the Big Ideas • History is not well represented, though several scientists got a paragraph or two about their discoveries in side bar boxes • A fairly typical text, laid out in the usual way.

• There were culminating “posters” that showed several centrally themed discoveries in both chemistry and physics, how they were linked and how they tied to real world uses that really gets to the “why should we care?” question	

General Comments: Though the text is laid out typically, it has a lot of great qualities. There are ties to other fields, to the student’s home and community – things they can relate to, and ties to interesting discoveries, such as aerogels and nanotechnology, and how chemistry and physics gets used in forensics. They cover all the usual concepts well, use a variety of ways to explore them, including problems, labs, as well as writing, reading for comprehension, testing for analysis. They have great supplementary materials, including reading, extra labs in forensics, and lots of skills worksheets for math and graphical analysis. Their challenge questions are interesting, and usually tie to something in the students’ home life or in the community. They could be deeper and tie more across other fields, but they start the process, which most texts don’t. They, more than most, work to answer the question “Why should I care about this?” throughout the text.

Certainly the materials get to the heart of each concept and each concept ties well to the two main areas (chemistry and physics) as a whole. The activities are logical and tie well one to another, using a multitude of phenomena students can relate to, to support learning. The material asks students from start to finish to ask questions, weight the evidence, analyze and formulate hypotheses and test them. The material assesses conceptual understanding and skill development throughout, leading to bigger and more interesting and diverse tasks as the concepts are learned. Historical development is not strong, and little evidence for the way that knowledge was arrived at, but this text had more introduction of historical figures than many texts, and some scientists had sidebar boxes about their lives and work. Finally, there was more summary and closure in this text than in most I’ve seen. I especially liked the “poster” at the end of both the chemistry and physics sections showing pivotal developments and the scientists who found them, how they tied to each other, and to some of the technologies developed because of them.

EALR 1 was well developed, speaking of systems, analysis, introducing complexity more so than many of the texts reviewed. They spoke of and asked the student to develop models to test their hypotheses. B,C, and D are better covered than A – feedback is not covered at all. **EALR 2** was the heart of the material. Students were asked to generate questions; investigate that question; collect and analyze data, using graphs, tables, averages; draw their own conclusions and compare them to the “norm” and ask why or why it did not match, write reports, and all of the other issues mentioned. **EALR 3** was fairly well developed. They tied more to cultural and world issues than many texts reviewed, and spoke of showed how technology and basic science differs. They began the difficult discussion about trade-offs, constraints and competing goals and ideals. All of the **EALR 4’s** were well covered. None were missed or short-changed. And yet there was not an overabundance of detail to bog the student down. An appropriate level of detail was used to support their understanding.

Overall, though the text was fairly typical, the material was presented in a logical, and engaging way. Students were asked regularly to tie the material back to their own lives and what was happening in their own communities, and one could imagine a great teacher taking that and exploring in a deeper way the larger issues at hand.

4.3.6 Physics

Publisher: It's About Time	**Program Name**: Active Physics
Reviewer: George Nelson, Ph.D.	**Grade Level/Course**: HS Physics
Strengths: • Well-conceived and constructed student inquiries focused on big ideas and explicitly addressing EALR 2. • Not formally strong on EALR 1, but the Chapter Mini-Challenges do a nice job of helping students engage in the engineering Design Cycle, which engages them with lots of different kinds of systems and their properties. The author just did not use the word system much. Better than the other books, though there were less pages listed in the alignment claims. • Has the smallest scope of all the materials—does not try to do fluids, relativity, or chemistry • Has a nice balance of quantitative and qualitative approaches	**Weaknesses**: • The format and approach are different enough from the traditional high school approach to teaching physics that substantial and sustained professional development and support will be required to implement effectively. • The explicit support for the teacher is not enough to ensure high fidelity implementation. • No chemistry, but then this is a physics text • EALR 1 Systems is not explicitly addressed (see strengths, though) • Support for teachers to use formative assessments to modify instruction is minimal
General Comments: 1. "Chapter Challenges provide strong sense of purpose for most students, though the scenarios seemed a bit male-centric (car crashes, sports voice-over, roller coaster design, sound and light show, etc.) These challenges also addressed EALR 3 much more deeply than the other materials. 2. The activities were connected to important physics as well as the scenarios and sequenced to help students learn the big ideas. Also, the big ideas were reinforced throughout the chapters where they were relevant. 3. Through and within the varied scenarios, the big ideas were illustrated through application of multiple and varied phenomena. For example, Newton's second law is discussed in the context of cars, roller coasters, spacecraft, springs, etc. 4. Student activities and evidence are at the core of the materials. The Essential Questions pieces do a nice job of explicitly reinforcing Inquiry and Nature of Science concepts. 5. There is a sequence of encounters with the big ideas. Whether it is logical is debatable since the flow of topics in a physics course is so broad that jumps are inevitable. When there is a logical connection, it seems to be made. 6. Connections among the conceptual ideas are made through the scenarios and the Engineering Design challenges.	

7.	The assessments vary from traditional numerical problems to clever projects that apply the big ideas in unique ways for students.
8.	Although, there is mention of some common student preconceptions in the teacher's guide, and students are explicitly asked to think about and express their ideas at the beginning of explorations of new concepts, there is little support for the teacher to help them respond to their student's thinking. (This is the only material at even recognized that student ideas are important, though which is a big step forward.)
9.	Active Physics addresses less topics than the more traditional texts, but still covers lots of ground.—enough to satisfy the state bean counters. Therefore, if all of the book is covered in a year, much of the instruction will be less deep than optimal for most students.
10.	There are some nice historical sidebars on important topics, which emphasize the nature of physics and how research is done.
11.	Active Physics does the best job of all the materials at "spiraling" through the big ideas. It is built around the idea of learning cycles (7E's in this case) so it does revisit ideas where appropriate.

Publisher: CPO Science	**Program Name**: Foundations of Physics
Reviewer: George Nelson, Ph.D.	**Grade Level/Course**: HS Physics
Strengths: • Well integrated laboratory exercises are associated with the lessons. Most lessons involve a relevant investigation though they occasionally are just blind applications of unsupported ideas—the "investigation" on special relativity, for example. • The laboratories use common equipment repeatedly. Once students have learned to use the apparati, they can focus on the data and results. • The learning goals are clearly stated at the beginning of every chapter along with the new terms and vocabulary words. • The teachers guide contains a "dialog" section that highlights the key ideas in each lesson and suggests things for the teacher to say. • The organization is typical, but logical. For example starting with one-dimensional motion then moving to two & three dimensions.	Weaknesses: • The pace of the lessons is very fast. Carrying out a full laboratory investigation, like Atwood's machine to explore Newton's 2^{nd} law, including reading and discussion in the 45 minutes suggested in the scope and sequence seems unreasonable, especially when it is followed the next day by another one. • There is a lot of new jargon and vocabulary—between 14 and 40 for each chapter, which is typically covered in three days. • There is no formative assessment, though there are occasional suggestions for dealing with questions that could come up in the "dialog" sections of the teacher guide. For example, how to deal with the exercise that measures speed in an obviously accelerating system. The idea of average speed in only introduced in the teacher's guide, not in the student materials. • "Application" sections often have little to do, or use concepts that are not

	introduce until later in the materials. For example, the application in chapter 4 is about antilock brakes which depends on an understanding of friction which is not introduced until chapter 6.

General Comments:

1. The learning goals for each lesson are clearly stated, but there is little connection relating one lesson to another. The materials break physics up into small packages without providing an overall sense of the discipline.
2. The activities follow the flow of the materials, which is traditional, but logical. They do build on one another, but the connections are not explicitly made in the text or teachers guide.
3. Because the material is lab based, most ideas are developed through exploration of one phenomenon. This is usually well done, but because the pace is so fast, it is probably not enough to help most students master the concepts.
4. Evidence-based arguments are developed for the big ideas, but usually only one per idea. For example, the conservation momentum, one of the HUGE ideas in physics is presented on the first page of the chapter as being "proved' rather than as a foundational assumption.
5. The big ideas are sometimes tied together. Newton's laws with the conservation of energy, and momentum for example, but only briefly. There is little time to discuss these key connections to make sure that students are making them.
6. Once the materials get past elementary mechanics, the rigor diminished significantly as topics are covered one after another in rapid succession, often without connection back to the basic ideas.
7. The assessments are generally good, especially the "Concept Review" questions which address many common student pre- and misconceptions. If students had time to complete and thoroughly discuss these questions, they could be very helpful. The problems are typical and will help students perform useful numerical calculations and prepare for typical tests.
8. There are no formative assessments that are used to provide feedback to students or to guide instruction. The pace is just too fast. The investigations could be used for formative purposes, if the teacher were to take the time to draw out students' ideas and adjust instruction to guide students building on or challenging their thinking. The potential of many of the investigations to provide formative data is high, but the opportunity is lost if the materials are used as designed.
9. The materials covers most of the topics covered in a one-year algebra-based undergraduate physics program but at a much more rapid and superficial level.
10. There is very little historical development of concepts. Many of the investigations are classics, but students will not gain an appreciation for the history of physics from these materials.
11. A learning cycle is not part of the pedagogical approach of these materials. The approach is to hit one topic and move on to the next. In the beginning, the flow of topics builds with time. The last half of the book is more of a loosely connected set of topics.

Publisher: Holt	**Program Name**: Physics
Reviewer: George Nelson, Ph.D.	**Grade Level/Course**: HS Physics

Strengths:	Weaknesses:
• This book has all of the content. It would make a good reference book. It is indistinguishable from a traditional first year algebra-based college physics text.	• The pedagogical approach is totally teacher-centered. Teaching tips are often "Explain to students…" or "You may wish to do several examples on the board…" • There is too much content which is covered too quickly. The level of detail is so high that the big ideas are often lost. • The "Misconception Alerts" rarely address actual student misconceptions of physics ideas. Rather, they are computational difficulties or conventions.

General Comments:

1. Sections start with questions and have listed objectives. The introductory paragraphs often invoke concepts that have not been covered yet. Friction is used to explain why a pushed car moves at a constant velocity 6 pages before it is introduced, for example.
2. There is a collection of activities, often cookbook. Here is a quote from the Teaching Tips for Inquiry Labs. "Students may use a procedure that differs from the sample procedure only if the alternate procedure meets the following conditions:
   - The procedure is safe.
   - The procedure can be done in the allotted time.
   - All necessary materials are available.
   - The procedure will prepare the students to answer the questions at the end of the lab when they are finished."

   One of the values of doing real inquiry is the opportunity to fail, redesign, redo, and learn. There is no Inquiry Lab at the end of Chapter 4, which covers Newton's Laws. Only a Skills Practice Lab which is an "investigation of physics principles in a traditional, multi-step format."
3. The materials do provide multiple and varied phenomena to support the idea of Newton's 2^{nd} Law. There are multiple examples with varied contexts that illustrate the broad application of the 2^{nd} law. EALRs 1-3 are largely ignored. Systems in only mentioned on page 7, then in the standard context of thermodynamics. Inquiry is missing altogether, and Applications are attempted in sections called "Why it Matters", but these are telling episodes of how some concepts work in the real world, not invitations or opportunities to apply concepts or explore how science has influenced society.
4. An evidence –based argument is not developed. Through the reading, students are given one initial example, then the 2^{nd} law is stated (including the introduction of a new mathematical symbol, Σ, the sum of force vectors, in this case, which was not done when the net force was defined five pages earlier!), then the chapter one numerical example and five numerical practice problems. These problems use F=ma to calculate the magnitude of one variable given the other two.
5. The text is logically developed, but not engaging for a first-time learner.
6. There are few conceptual connections developed. Some are pointed out, but not made real by asking students to think about them. For example, after a brief three-page explanation of

friction, followed by three pages of numerical examples and problems computing forces and coefficients, students are told that air resistance is a form of friction and that friction is really an electromagnetic force. Electric forces are explained 413 pages later. The connection between electricity and magnetism follows 140 pages after that!

7. The assessments are primarily traditional computational problems, given a situation, plug into the formula and get an answer. Each chapter has a small set of "conceptual questions" that are very similar the chapter review questions. They are mostly non-numerical. Some of them do require some higher order thinking.
8. There are no formative assessments where students are asked for their thinking about a concept and the teacher is guided to help students confront or reinforce that thinking.
9. The material does not focus on the development of a limited number of fundamental concepts. That is one big reason why it is a good reference book, but a poor textbook. Topics include special and general relativity, chemistry, and nuclear reactions – at very superficial levels.
10. There are nice "Physics and Its World Timelines in the book, but nothing is done with them that I could find. Occasionally, an "Alternative Assessment" will ask a student to research the history of a concept or discovery.
11. There is no learning cycle approach to the topics used in the text.

Publisher: CPO Science	**Program Name**: Physics: A First Course
Reviewer: George Nelson, Ph.D.	**Grade Level/Course**: HS Physics
Strengths: • This is an attractive set of materials. • There are investigations that accompany most lessons that use a common set of equipment • The assessment items are generally well-written and address the big ideas.	Weaknesses: • Covers too many topics, too fast. Lesson Planner anticipated 172 teaching days per year. Newton's Laws and the conservation of energy and momentum are "covered" in 22, 45 minute class periods including review and tests. Work and power are "covered" in 5 pages. • Claims to be based on the "national state standards for Physics" which is a non-sense phrase. • EALRs 1-2 are barely addressed. • EALR 3 is addressed by interesting but often irrelevant "Connections" essays. For example, Newton's laws are illustrated by an article with famous stroboscopic pictures from Harold Edgerton. Only the picture of the apple accelerating has any relevance.
General Comments:	

1. This materials looks like a scaled down version of CPS Science's other material, Foundations of Physics, but not in the sense of reducing the number of topics and going into more depth. It actually keeps the same number of topics as Foundations, plus general relativity, but reduces the depth that topics are addressed to a very superficial level in many cases. The materials are nicely laid out and the prose is well-written. A student with an interest in science will find the book interesting. There are some interesting shortcuts like "describing the "organization of the universe" without mentioning space, (or time) only matter and energy.
2. It is difficult to say if the sequence of activities is logical or strategic because they are so superficial. For example, Investigation 2A which is about Newton's 1st law launches carts along a section of straight track with a rubber band and rolls carts down a ramp and across a flat section of track and measures speed at different points on the trajectories. While this is a good inquiry set up, it is not possible in 45 minutes for most students to be able to figure out that the force of gravity is proportional to the mass of the cart while the force of the rubber band launcher is not, and therefore heavy and light objects fall a the same rate. In our college classes for future elementary teachers we take over 18 hours of class time to get to this point.
3. There is typically only one phenomena used to support the learning of a concept.
4. Arguments are evidence-based. The activities and investigations are of high quality, they are simply too short and not used as real inquiries. Therefore, they will not be effective in helping most students learn.
5. The sequence of ideas may be logical, but they are not tied together.
6. No, the materials don not draw attention to appropriate conceptual connections.
7. The "Reviewing Concepts" and "Solving Problems" items are well designed and written. They do require thinking about and applying the big ideas. They could be used formatively if there were time. The Applying Your Knowledge questions are also interesting if there were time to do them. They could be good homework assignments.
8. There is no formative assessment imbedded in the materials.
9. The materials do not focus on a limited number of big ideas. It superficially covers all of the topics in a typical one-year algebra-based undergraduate physics course.
10. The only history I could find is in the "Applying Your Knowledge" questions where students are asked to research historical aspects of some concepts. There are no suggestions for good resources.
11. There is no learning cycle in the pedagogical model of these materials. Students are taken though the concepts once at breakneck speed.

5 Data Analysis Approach

The purpose of this section is to describe the data collection and analysis approach for the curriculum review. It covers the use of a rating scale, data collection, and statistical methodology. There are two parts to this section; an overview and a detailed statistical analysis.

5.1 Overview

We divided the data by grade level (Elementary, Middle School, and High School) and, within High School, by program type (Integrated, Earth Science, Physical Science, Biology, Chemistry, and Physics). We then analyzed each of these groups separately, based on weighted average scores. We compared these scores to find the top three or more programs in each category.

In calculating the weighted scores, we considered using a linear mixed effects model to control for possible reviewer bias by including a random intercept for reviewer. However, since the design is not complete – i.e., only some reviewers review each program – we cannot fully separate reviewer effects and program effects. Thus, if a particular reviewer happened to see only the most strongly aligned programs, their overall average score would be high, not because they were biased, but because they scored strong programs. Adjusting for this would effectively be punishing the programs that were seen by that reviewer. Thus, we chose to test for reviewer bias first, and only use the adjusted model if there was evidence of severe bias. If not a simple average or weighted average was to be used.

There are a number of legitimate ways to then compare the program scores to each other. We hoped to keep the analysis relatively clear and simple, to facilitate transparency of the report. To this end, we opted to use t-tests to compare programs, a widely used and well understood method. In this study, we are comparing averages of many scores for each program, which allows us to use a t-test even though the data are not normally distributed. The results, threshold tests and program comparisons, were kept to the traditional 0.05 significance level.

A significance level of 0.05 is meant to imply that we are willing to accept a 5% chance that we will reach the wrong conclusions based on the data we collect. There are theoretical results that show that this significance level is maintained when doing one or more tests (controlling for multiple comparisons in the latter case) *when the analysis plan is constructed without looking at the data*. Once analysis decisions are made based on what we see in the data itself, we no longer can make the assumptions necessary to know the distribution of outcomes. In this case, p-values no longer carry the meaning they did when we planned our analysis in advance; we cannot make rigorous conclusions about the statistical significance of a result.

5.1.1 Rating Criteria

In data collection, Content/Standards Alignment (hereafter “content”) questions were rated on a 4 point scale, with 4 points indicating that all of the content in the standard is fully present, 3 points indicating that most but not all of the content in the standard is present, 2 points indicating that a significant amount of the content in the standard is missing, and 1 indicating that all or most of the content in the standard is missing. Other factors (Program Coherence, Assessment, Equity and Accessibility, Facilitating Instruction, Student Learning) were rated on a 4 point Likert scale.

These are ordinal variables, and not inherently numeric. In the analysis that follows, we assumed that the "distance" between two consecutive levels is the same across a scale. That is, the value added by moving from "Not met" to "Lacking content" is the same as moving from "Lacking content" to "Lacking practice" in the standards. Similarly, the value added moving from "Strongly disagree" to "Disagree" is the same as from "Disagree" to "Agree" on the Likert Scale.

The data were initially recorded on a 1-4 integer scale. With one exception, our measures are positively oriented – that is, the higher the score, the better. One item, the 6^{th} Program Coherence measure, was negatively oriented, so that lower scores were better. To properly combine this item with the other measures, we reversed it, so that a 1 would be coded as a 4, a 2 as a 3, and so on. We then rescaled all scores to be on a [0,1] scale by subtracting 1 and dividing by 3.

5.2 Detailed Statistical Analysis

5.2.1 Reviewer Bias

For each grade level and program type we assessed the scores to look for evidence of reviewer bias. In each case we present a plot showing the average score given by each reviewer, sorted in increasing order, with a 95% confidence interval for the reviewer's mean score.

In order to test whether any reviewer had a tendency to over- or under-rate, we calculated a standardized score within text for each reviewer, and performed a t-test comparing each average standardized score to 0 to test whether the reviewer tended to score away from the mean. In some of the following results there are fewer tests than there were reviewers - it was not possible to test for reviewers with only one review, as no standard error could be estimated, but the plots indicate that none of these cases showed particularly unusual scores, so there is little to be concerned about.

Since we performed tests for many reviewers, it was important to adjust for multiple comparisons to avoid finding a difference significant when it could have happened by chance when drawing several means from the same distribution. Each table gives the adjusted significance level, calculated using the Holm-Bonferroni method, in which we compare the ordered p-values to the nominal significance level (0.05) divided by the number of tests remaining. As soon as one test is deemed insignificant, the rest are also. Within each table, the results are presented in the order tested, sorted from most significant to least significant difference.

5.2.1.1 Elementary School

First we considered elementary school. Table 14 shows that there are no reviewers with scores significantly different from average. Thus, for the elementary school ratings, there was no evidence of reviewer bias.

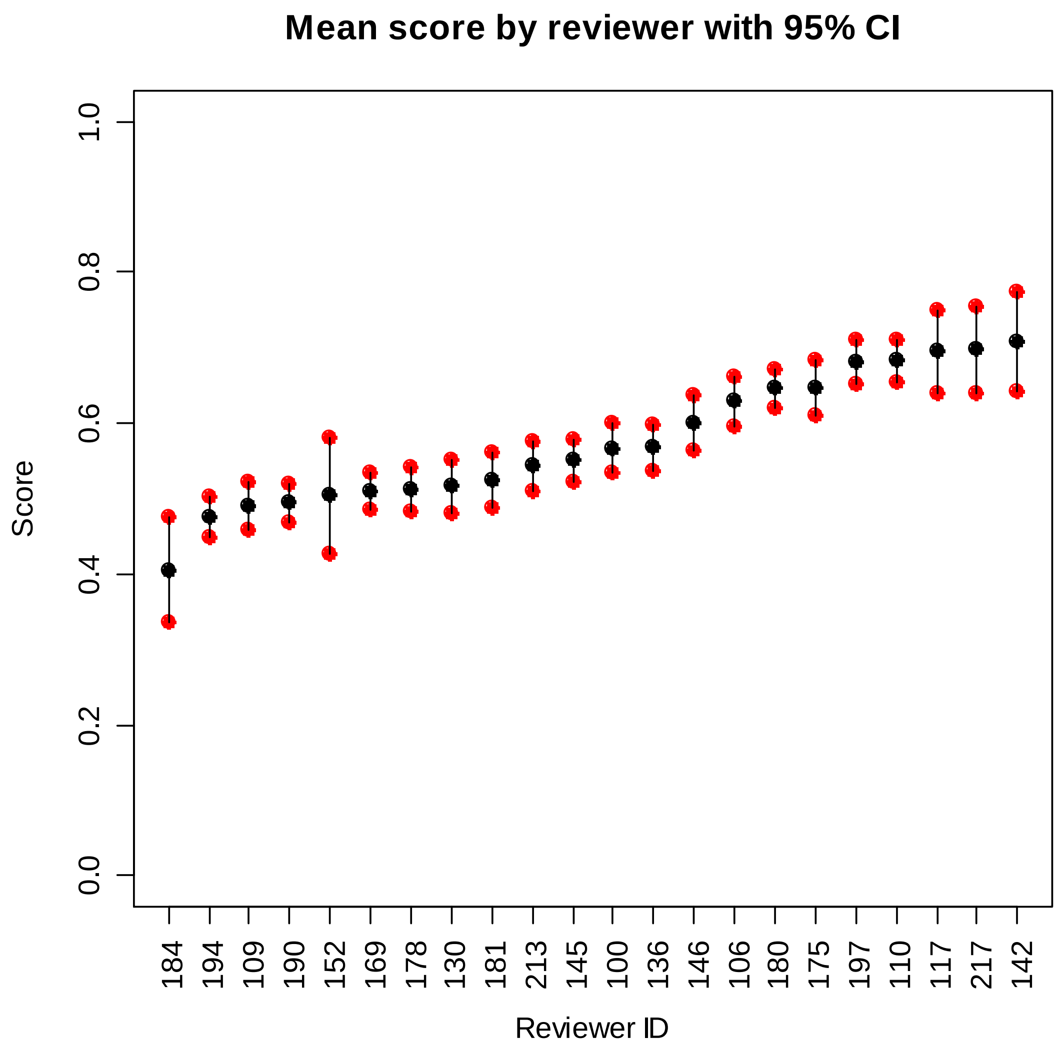

Figure 60. Elementary mean scores by reviewer.

Table 14: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
169	0.0120	0.0029
110	0.0430	0.0031
194	0.0527	0.0033
197	0.1363	0.0036
180	0.1412	0.0038
190	0.1952	0.0042
109	0.2574	0.0045
175	0.3305	0.0050
106	0.3344	0.0056

Reviewer	p-value	adjusted significance level
145	0.3375	0.0063
178	0.4125	0.0071
130	0.5580	0.0083
181	0.6958	0.0100
213	0.6997	0.0125
100	0.8066	0.0167
136	0.8174	0.0250
146	0.9682	0.0500

5.2.1.2 Middle School

Table 15 shows that there are no reviewers with scores significantly different from average. Thus, for the middle school ratings, there was no evidence of reviewer bias.

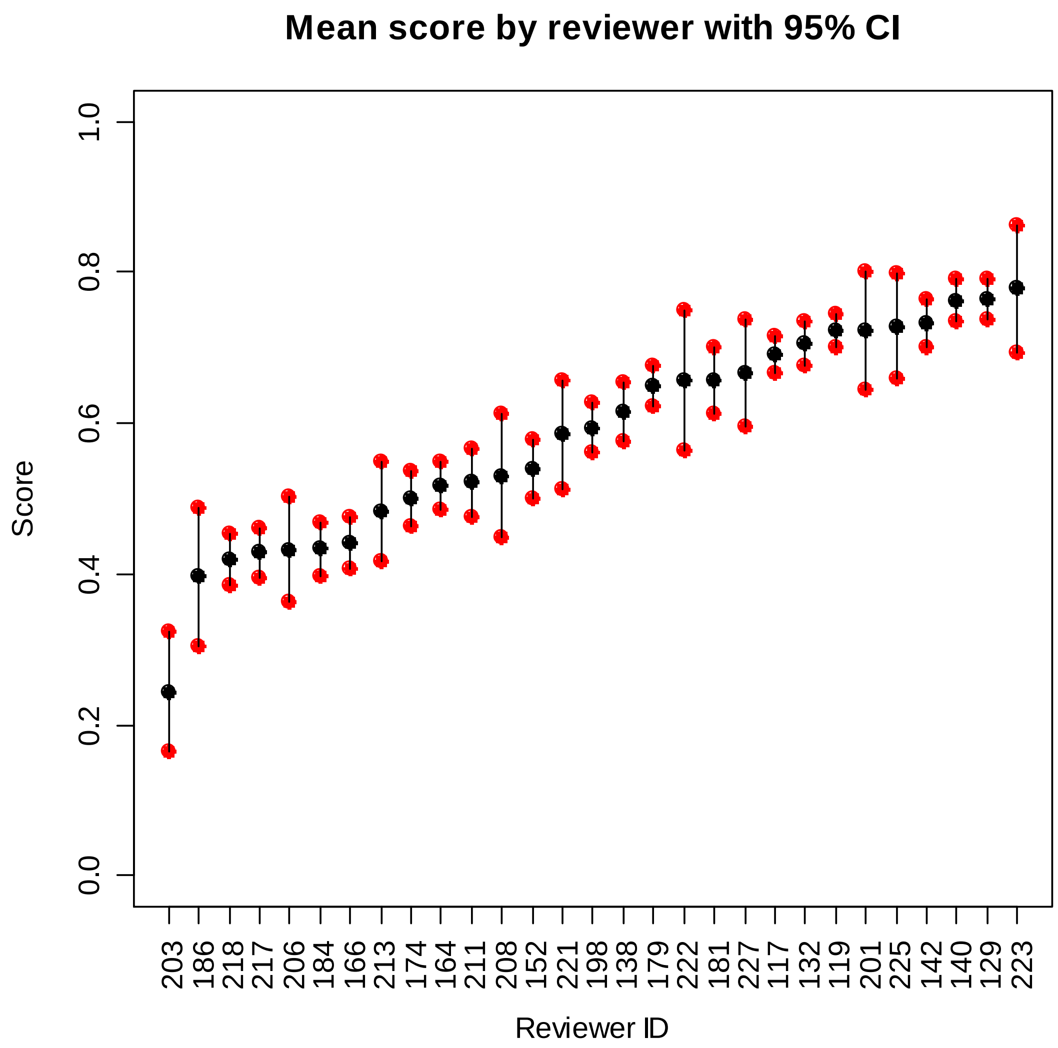

Figure 61. Middle school mean scores by reviewer.

Table 15: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
166	0.0154	0.0029
129	0.0442	0.0031
174	0.1105	0.0033
142	0.1251	0.0036
152	0.1369	0.0038
217	0.1519	0.0042
138	0.1955	0.0045
119	0.2059	0.0050
140	0.2595	0.0056
164	0.2736	0.0063

Reviewer	p-value	adjusted significance level
218	0.2746	0.0071
198	0.4022	0.0083
132	0.4925	0.0100
117	0.5895	0.0125
184	0.7797	0.0167
179	0.8743	0.0250
181	0.9713	0.0500

5.2.1.3 High School Biology

Table 16 shows that there are no reviewers with scores significantly different from average. Thus, for the high school biology ratings, there was no evidence of reviewer bias.

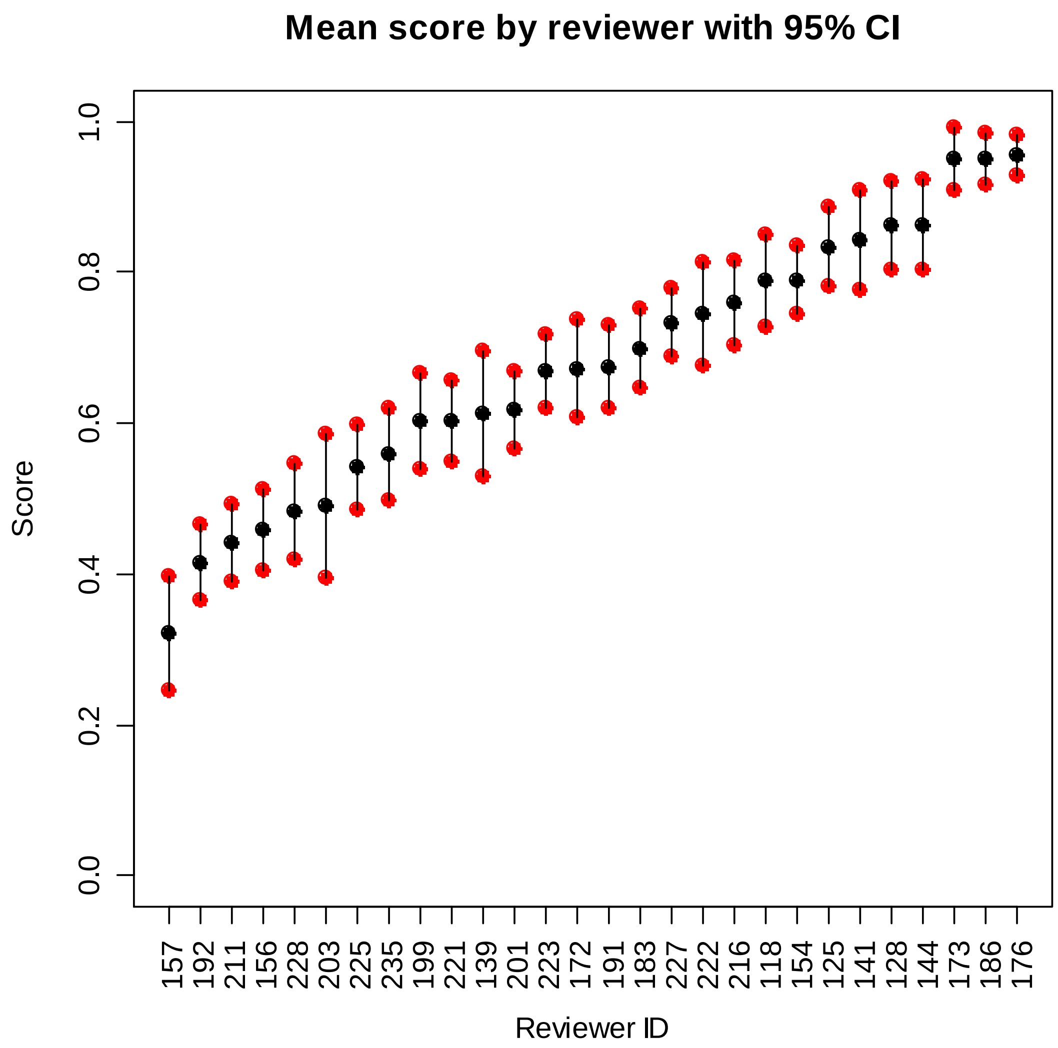

Figure 62. HS Biology mean scores by reviewer.

Table 16: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
192	0.1619	0.0038
191	0.1794	0.0042
154	0.3303	0.0045
221	0.3605	0.0050
228	0.3815	0.0056
156	0.3939	0.0063
223	0.4490	0.0071
227	0.4948	0.0083
201	0.5305	0.0100

Reviewer	p-value	adjusted significance level
235	0.7858	0.0125
225	0.8414	0.0167
183	0.8859	0.0250
157	0.9981	0.0500

5.2.1.4 High School Chemistry

Table 17 shows that there are no reviewers with scores significantly different from average. Thus, for the high school chemistry ratings, there was no evidence of reviewer bias.

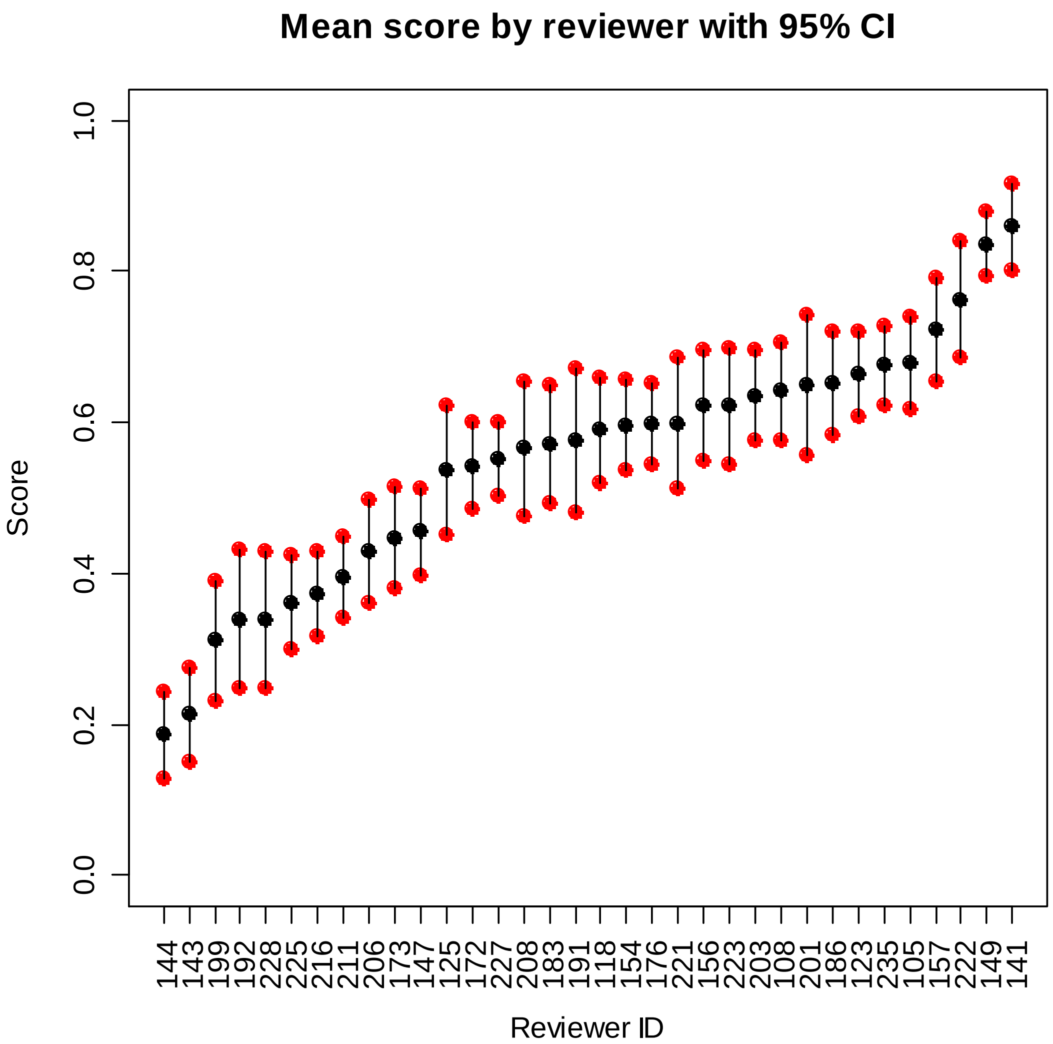

Figure 63. HS Chemistry mean scores by reviewer.

Table 17: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
173	0.0073	0.0036
203	0.0717	0.0038
118	0.0740	0.0042
108	0.1159	0.0045
216	0.2721	0.0050
147	0.2971	0.0056
235	0.3311	0.0063
176	0.4061	0.0071
149	0.4287	0.0083
227	0.4746	0.0100
186	0.4824	0.0125
123	0.8178	0.0167
105	0.8613	0.0250
154	0.8938	0.0500

5.2.1.5 High School Earth Science

Table 18 shows that there are no reviewers with scores significantly different from average. Thus, for the high school earth science ratings, there was no evidence of reviewer bias.

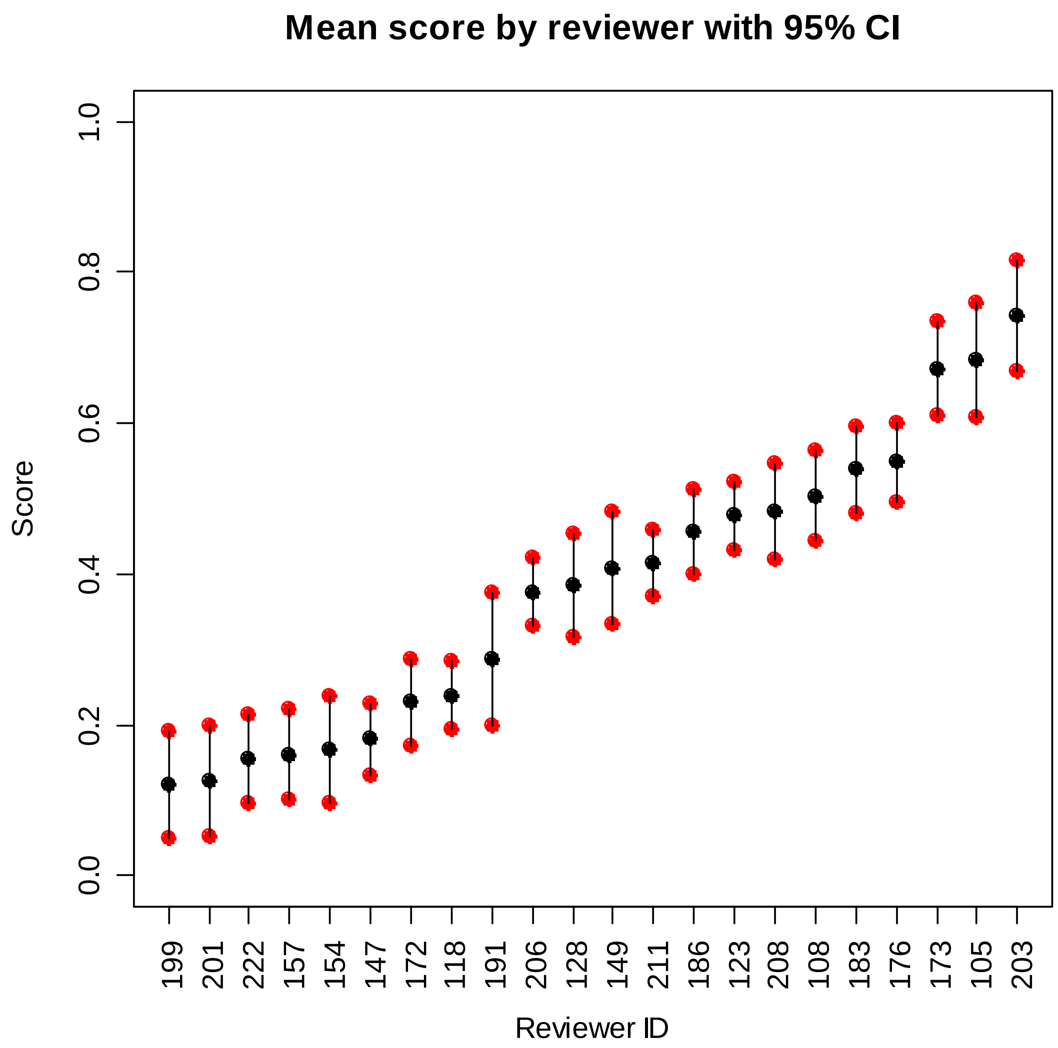

Figure 64. HS Earth Science mean scores by reviewer.

Table 18: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
183	0.1483	0.0056
118	0.1719	0.0063
186	0.2876	0.0071
176	0.3385	0.0083
147	0.3412	0.0100
173	0.3642	0.0125
206	0.5000	0.0167
123	0.6138	0.0250
108	0.6322	0.0500

5.2.1.6 High School Integrated Science

Table 19 shows that there are no reviewers with scores significantly different from average. Thus, for the high school integrated ratings, there was no evidence of reviewer bias.

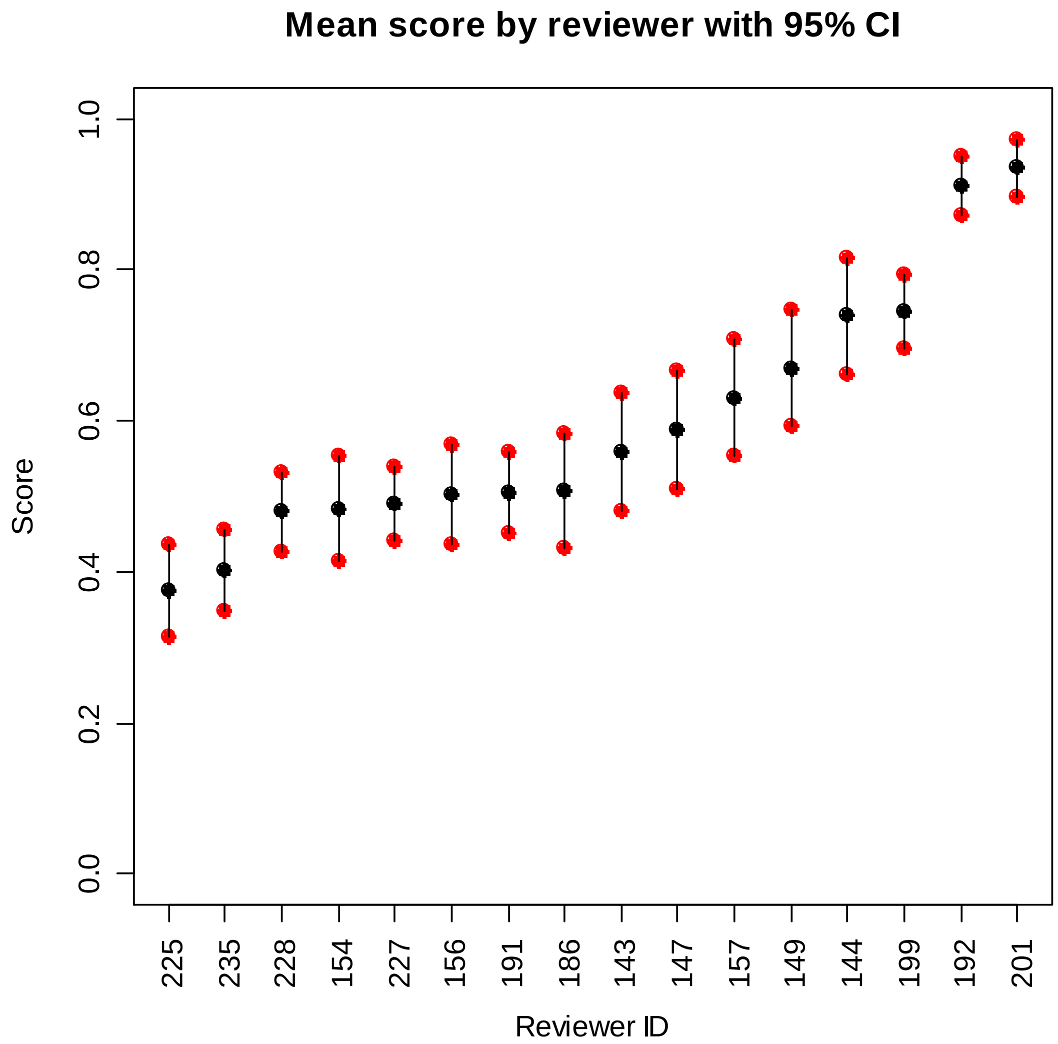

Figure 65. HS Integrated Science mean scores by reviewer.

Table 19: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
191	0.5086	0.0250
228	0.9407	0.0500

5.2.1.7 High School Physical Science

Table 20 shows that there are no reviewers with scores significantly different from average. Thus, for the high school physical science ratings, there was no evidence of reviewer bias.

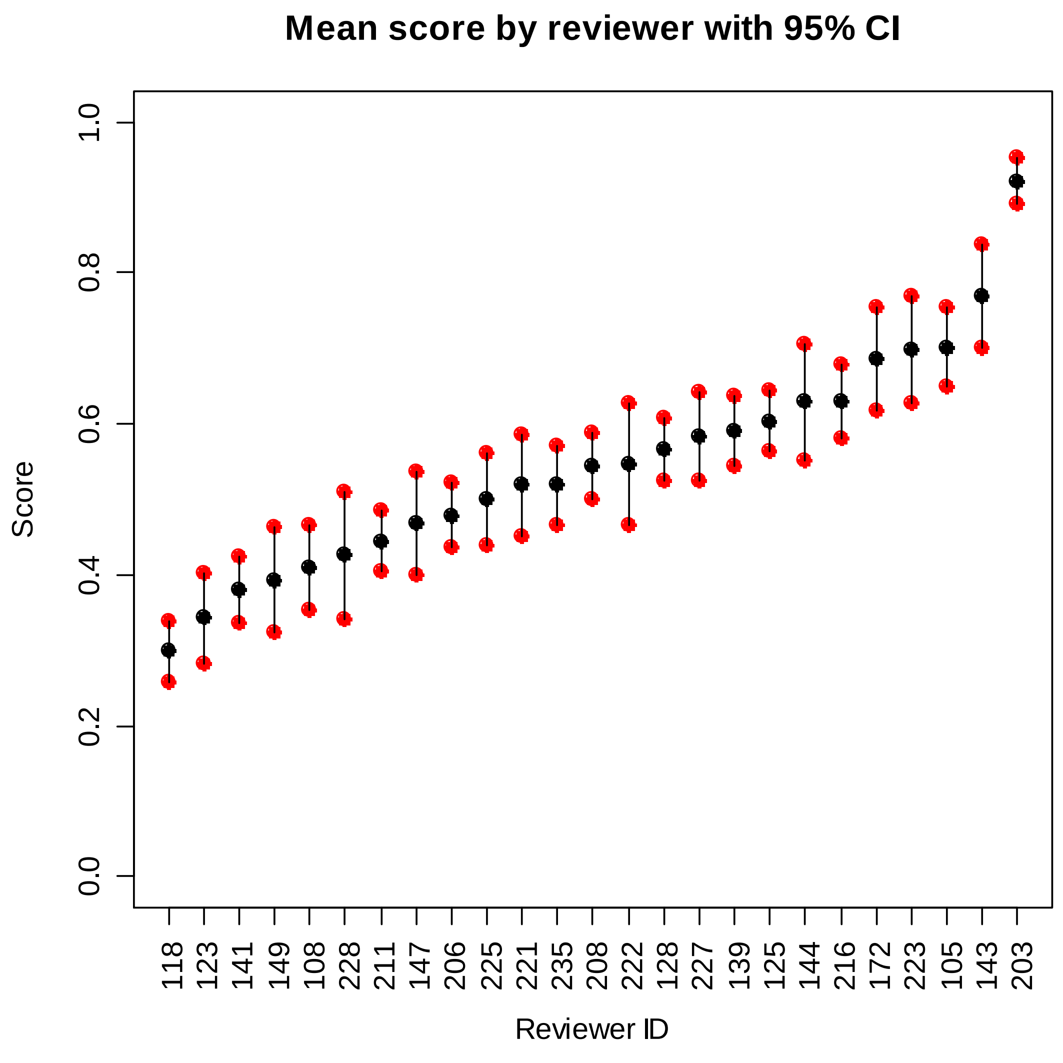

Figure 66. HS Physical Science mean scores by reviewer.

Table 20: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
203	0.0645	0.0045
118	0.1301	0.0050

Reviewer	p-value	adjusted significance level
211	0.1678	0.0056
206	0.1769	0.0063
125	0.1924	0.0071
105	0.2148	0.0083
141	0.3392	0.0100
108	0.4842	0.0125
139	0.7761	0.0167
208	0.7934	0.0250
128	0.9916	0.0500

5.2.1.8 High School Physics

Table 21 shows that there are no reviewers with scores significantly different from average. Thus, for the high school physics ratings, there was no evidence of reviewer bias.

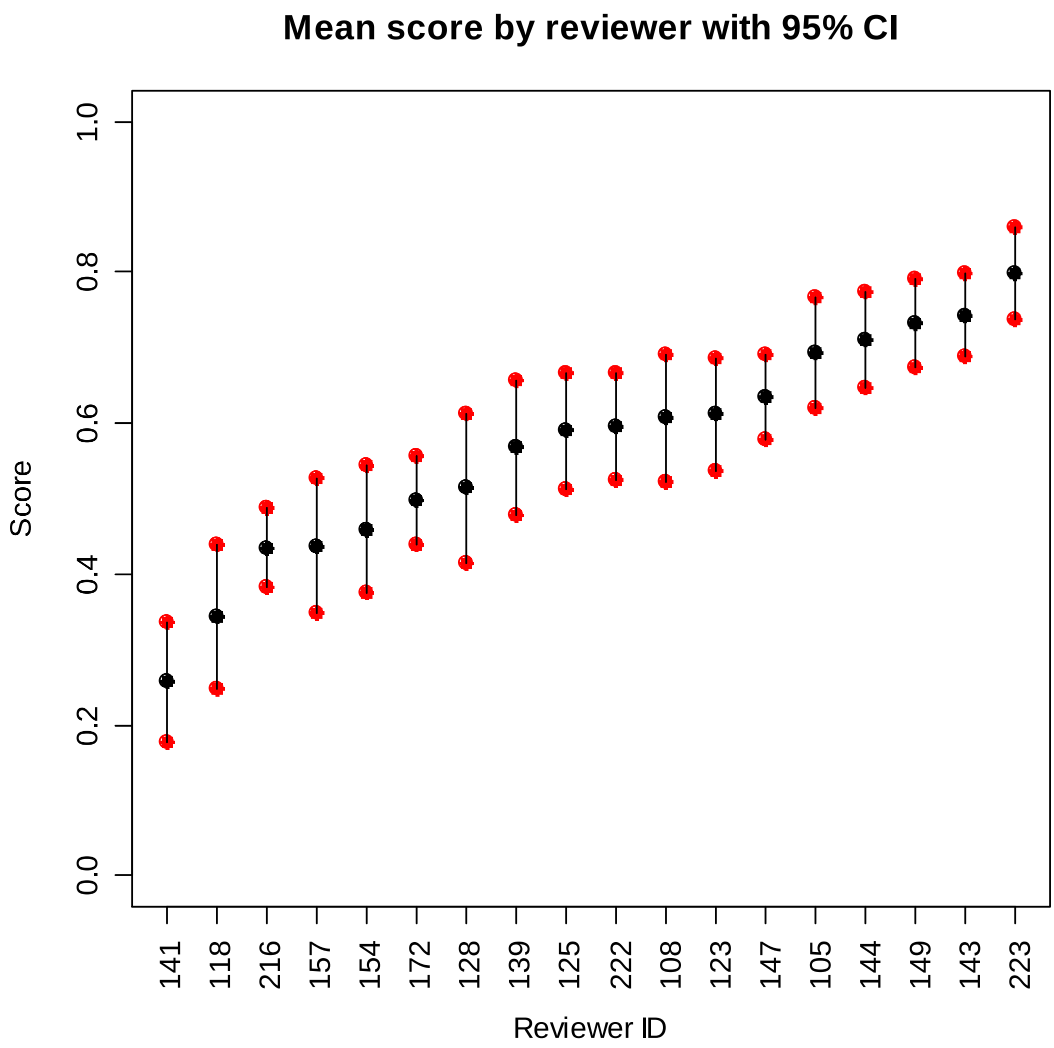

Figure 67. HS Physics mean scores by reviewer.

Table 21: t test results for reviewer bias

Reviewer	p-value	adjusted significance level
147	0.2181	0.0100
149	0.2343	0.0125
143	0.6158	0.0167
216	0.6357	0.0250
144	0.8853	0.0500

5.2.2 Curriculum Evaluation

5.2.2.1 Confidence Intervals

A composite score was calculated based on both content and key program elements, giving 50% weighting to standards alignment, 20% to program coherence, 5% to assessment, 5% to equity and accessibility, 10% to facilitating instruction, and 10% to student learning. Corresponding weighted variances and standard errors were then calculated as well, which were then used to calculate the following 95% confidence intervals for each set of program materials. See *Section 1.5 Findings* for the tables and graphs that show the 95% confidence intervals.

The Welch-Sattherwaite equation gives us an approximation to the degrees of freedom for a confidence interval for a weighted average.

Take *s* to be the standard error of the weighted average.

The degrees of freedom are then given by

$$\frac{s^4}{m}$$

where

$$m = \sum_i \frac{\left(w_i^2 s_i^2\right)^2}{n_i - 1}$$

The index i i ranges over the six response scales. $w_i$is the category weight, n_i n_i is the number of scores in that category and s_i s_i is the standard error of observations in that category.

Then the confidence interval is calculated by

$$CI = Composite \pm t^*(s)$$

Where, again, *s* represents the standard error of the weighted average, and t^* is the appropriate quantile from a t distribution using the degrees of freedom as found above.

5.2.2.2 Program Comparisons

Our goal was to identify the top three programs, plus any statistical ties, to recommend for further evaluation. To do this, we compared the scores of the lower-ranked programs to the third-ranked (as determined by the weighted average score across scales). We performed the comparisons using t-tests, adjusting, as with the reviewer bias tests, for multiple comparisons using the Holm-Bonferroni method. To do so, we compared the ordered p-values to the nominal significance level

(0.05) divided by the number of tests remaining. As soon as one test is deemed insignificant, the rest are as well.

The Welch-Sattherwaite equation gives us an approximation to the degrees of freedom for a t-test comparing weighted averages.

Take s_1 s_1 and s_2 s_2 to be the standard errors of the two programs to be compared.

The degrees of freedom are then given by

$$\frac{(s_1^2 + s_2^2)^2}{m_1 + m_2}$$

where

$$m_k = \sum_i \frac{\left(w_i^2 s_i^2\right)^2}{n_i - 1}$$

The index i i ranges over the six response scales. w_i is the category weight, n_i n_i is the number of scores in that category and s_i s_i is the standard error of observations in that category.

The results for each grade level and program are given in the tables below. In each case, the top three programs plus any ties are highlighted.

Table 22: Elementary School Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Science Companion	0.6661		
STC	0.6258		
FOSS (K-5)	0.6066		
Science – Diamond Edition	0.6048	0.4466	0.0500
Science: A Closer Look	0.5973	0.2427	0.0250
Experience Science	0.4159	0.0000	0.0167

Table 23: Middle School Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Science Explorer	0.8694		
ML: Science Modules	0.8147		
FOSS (6-8)	0.7813		

Program	Composite score	p-value	Adjusted significance level
LA: Issues Series	0.7057	0.0000	0.0500
IAT: Earth/Life/Physical Series	0.6972	0.0000	0.0250
STC Earth/Life/Physical Series	0.5869	0.0000	0.0167
Glencoe Earth/Life/Physical	0.5675	0.0000	0.0125
Science - Diamond Edition	0.5404	0.0000	0.0100
Holt Science & Technology	0.4952	0.0000	0.0083
KH: Investigating Series	0.4890	0.0000	0.0071
Glencoe Blue/Green/Red	0.4269	0.0000	0.0063

Table 24: High School Biology Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Biology: A Human Approach	0.8981		
Insights in Biology	0.7973		
Pearson Biology	0.6564		
Glencoe Biology	0.6531	0.4552	0.0500
Agile Mind Biology	0.6332	0.2148	0.0250
Holt Biology	0.5437	0.0000	0.0167
McGraw-Hill Life Science	0.4949	0.0000	0.0125
What is Life? A Guide to Biology	0.4401	0.0000	0.0100

Table 25: High School Chemistry Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Active Chemistry	0.8434		
Kendall/Hunt Chemistry	0.6854		
Chemistry: Matter and Change	0.5724		
Chemistry: C&A	0.5500	0.1996	0.0500
Chemistry in the Community	0.5224	0.0453	0.0250
Holt Modern Chemistry	0.5073	0.0135	0.0167
World of Chemistry	0.4992	0.0025	0.0125
Pearson Chemistry	0.4757	0.0007	0.0100
Investigating Chemistry	0.3629	0.0000	0.0083

Table 26: High School Earth Science Composite Score tests

Program	Composite score	p-value	Adjusted significance level
EarthComm	0.7992		
Glencoe Earth Science: GEU	0.5434		
Holt Earth Science	0.5133		
McGraw-Hill Earth & Space Science	0.4553	0.0195	0.0500
Pearson Earth Science	0.3281	0.0000	0.0250
Science of Earth Systems	0.2648	0.0000	0.0167
Discovering the Universe	0.2131	0.0000	0.0125
Essential Earth	0.1615	0.0000	0.0100

Table 27: High School Integrated Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Science: An Inquiry Approach	0.8023		
Coordinated Science	0.7079		
Science and Sustainability	0.5813		
Conceptual Integrated Science	0.4267	0.0000	0.0500

Table 28: High School Physical Science Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Active Physical Science	0.7077		
Foundations of Physical Science	0.6948		
Holt Physical Science	0.6097		
Glencoe Physical Science	0.5302	0.0002	0.0500
Glencoe Physical Sci w/ Earth Sci	0.5185	0.0001	0.0250
McGraw-Hill Physical Science	0.4807	0.0000	0.0167
Holt Physical, Earth & Space	0.4956	0.0000	0.0125
Pearson Physical Science	0.4636	0.0000	0.0100
Conceptual Physical Science	0.3854	0.0000	0.0083

Table 29: High School Physics Composite Score tests

Program	Composite score	p-value	Adjusted significance level
Active Physics	0.8764		
Foundations of Physics	0.6003		
Holt Physics	0.5573		
Physics: A First Course	0.5369	0.2549	0.0500
Conceptual Physics	0.4963	0.0370	0.0250
Glencoe Physics	0.4811	0.0069	0.0167

5.2.2.3 Standard Error Calculations

This section describes the calculation of the standard errors used in the above analyses.

Let $X_{ijkl}^{(p)}$ be the score for program p on item l for scale i, grade j, by rater k.

Here:

- p indexes the various curricula
- i = 1,…, 6, indexes the 6 scales assessed (Content/Standards Alignment, Equity and Accessibility, etc.)
- j = 1,…,J, indexes the grade levels.
- k = 1,…,K_j indexes the reviewers.
- l = 1,…,L_{ij}. L_{ij} index the number of items scored, and varies depending upon the grade level and scale.

The final weighted average score for program p is

$$\overline{X}_w^{(p)} = \sum_{i=1}^{6} w_i \overline{X}_{i...}$$

where w_i is the weight given to scale i, and $\overline{X}_{i...}$ is the average rating given on items in scale i on program p, averaged over grade levels and raters.

More formally,

$$\overline{X}_w^{(p)} = \sum_{i=1}^{6} w_i \sum_{j=1}^{J} \sum_{k=1}^{K_j} \sum_{l=1}^{L_{ij}} X_{ijkl} / N_i ,$$

where

$$N_i = \sum_{j=1}^{J} K_j L_{ij}$$

is the number of item scores on scale i for program p.

The precision with which the final score for program p can be assessed depends upon the number of ratings and the variability of the ratings. More ratings correspond to higher precision (lower variance and standard error). Lower variability of ratings, indicating greater agreement among ratings, corresponds to higher precision. In addition, the weights given to the 6 different categories impact the variance and standard error. Note also that the standard error (SE) is the square root of the variance of the average.

For the current problem, the variance for the weighted average $\overline{X}_w^{(p)}$ (Final Score for program p) can be computed as follows.

$$Var(\overline{X}_w^{(p)}) = \sum_{i=1}^{6} w_i^2 Var(\overline{X}_{i...})$$

Three assumptions are inherent in this computation: (1) independence of the ratings $X_{ijkl}^{(p)}$ (2) independence of scales, and (3) all items within a scale are assessing program p on category i (in other words, all items are independent and identically distributed measures of a true scale average for program p).

$$Var(\overline{X}_{i...}) = \sigma_i^2 / N_i .$$

The usual estimator for σ_i^2 is the sample variance s_i^2, computed from the N_i scores $X_{ijkl}^{(p)}$

Thus the estimated standard error (SE) for $\overline{X}_w^{(p)}$, the Final Score for program p is

$$\sqrt{\sum_{i=1}^{6} w_i^2 s_i^2 / N_i}$$

Appendix A. Programs Reviewed

The following tables list programs included in the review.

Table 30. Elementary Programs Reviewed.

Publisher	Program	Date
Carolina Curriculum	STC	2004-2010
Carolina Curriculum	STC	2004-2010
Carolina Curriculum	STC	2004-2010
Chicago Ed Pub Co, LLC	Science Companion	2004-2006
Delta Education	FOSS (K-5)	2005/2009
Houghton Mifflin Harcourt	Experience Science	2007
Houghton Mifflin Harcourt	Experience Science	2007
Houghton Mifflin Harcourt	Experience Science	2007
MacMillan	Science: A Closer Look	2008
Pearson (Scott Foresman)	Science - Diamond Edition	2010
Pearson (Scott Foresman)	Science - Diamond Edition	2010
Pearson (Scott Foresman)	Science - Diamond Edition	2010
Pearson (Scott Foresman)	Science - Diamond Edition	2010
Zula International	Exploration/Discovery	2009

Table 31. Middle School Programs Reviewed.

Publisher	Program	Date
Carolina Curriculum	STC	2004-2010
Delta Education	FOSS (6-8)	2005/2009
Glencoe	Glencoe Blue	2008
Glencoe	Glencoe Earth Science	2008
Glencoe	Glencoe Green	2008
Glencoe	Glencoe Intro to Physical Science	2008
Glencoe	Glencoe Life Science	2008
Glencoe	Glencoe Red	2008
Holt McDougal	Holt S&T Physical	2008
Holt McDougal	Holt S&T: Earth Science	2007
Holt McDougal	Holt S&T: Life Science	2007
It's About Time	Project Based Inquiry Science	2009
It's About Time	IAT: Investigating Earth Systems	2008
It's About Time	Interactions in Physical Science	2008
It's About Time	Project-Based Life Science	2009
Kendall/Hunt (BSCS)	Investigating Life Systems	2005
Kendall/Hunt (BSCS)	Investigating Physical Systems	2005
Kendall/Hunt (BSCS)	Kendal l Hunt: Investigating Earth Systems	2005
LAB-AIDS, Inc.	Issues and Earth Science	2006
LAB-AIDS, Inc.	Issues and Life Science	2009
LAB-AIDS, Inc.	Issues and Physical Science	2007
McDougal Littell	ML: Earth Science Modules	2007
McDougal Littell	ML: Life Science Modules	2007
McDougal Littell	ML: Physical Science Modules	2007
Pearson (Prentice Hall)	Science Explorer	2009
Science Curriculum Inc.	Force, Motion, and Energy	2002/2005
Science Curriculum Inc.	SCI: Introductory Physical Science	2002/2005

Table 32. High School Programs Reviewed.

Course	Publisher	Program	Date
Biology	Agile Mind	Agile Mind Biology	2008
	Bedford, Freeman & Worth	What is Life? A Guide to Biology	2009
	Glencoe	Glencoe Biology	2009
	Holt McDougal	Holt Biology	2010
	Kendall/Hunt	Insights in Biology	2007
	Kendall/Hunt (BSCS)	Biology: A Human Approach	2006
	McGraw-Hill/Wright	McGraw-Hill Life Science	2009
	Pearson (Prentice Hall)	Pearson Biology	2010
Chemistry	Bedford, Freeman & Worth	Investigating Chemistry	2009
	Bedford, Freeman & Worth	Chemistry in the Community	2006
	Glencoe	Chemistry: C&A	2009
	Glencoe	Chemistry: Matter and Change	2008
	Holt McDougal	World of Chemistry	2007
	Holt McDougal	Holt Modern Chemistry	2009
	It's About Time	Active Chemistry	2007
	Kendall/Hunt	Kendall/Hunt Chemistry	2009
	Pearson (Prentice Hall)	Pearson Chemistry	2008
Earth Science	Bedford, Freeman & Worth	Discovering the Universe	2008
	Bedford, Freeman & Worth	Essential Earth	2009
	Delmar Cengage Learning	Science of Earth Systems	2008
	Glencoe	Glencoe Earth Science: GEU	2008
	Holt McDougal	Holt Earth Science	2010
	It's About Time	Earth Comm	2005
	McGraw-Hill/Wright	McGraw-Hill Earth & Space Science	2009
	Pearson (Prentice Hall)	Pearson Earth Science	2009
Integrated	It's About Time	Coordinated Science: Physical, Earth & Sp	2009
	Kendall/Hunt (BSCS)	Science: An Inquiry Approach	2008
	LAB-AIDS Inc.	Science and Sustainability	2006
	Pearson (Prentice Hall)	Conceptual Integrated Science	2010
Physical Science	CPO Science	Foundations of Physical Science	2009
	Glencoe	Glencoe Physical Science	2008
	Glencoe	Glencoe Physical Sci w/ Earth Sci	2008
	Holt McDougal	Holt Physical Science	2008
	Holt McDougal	Holt Physical, Earth & Space	208
	It's About Time	Active Physical Science	2009
	McGraw-Hill/Wright	McGraw-Hill Physical Science	2009
	Pearson (Prentice Hall)	Conceptual Physical Science	2010
	Pearson (Prentice Hall)	Pearson Physical Science	2009
	Science Curriculum Inc.	Force, Motion, and Energy	2002/2005
	Science Curriculum Inc.	SCI: Introductory Physical Science	2002/2005
Physics	CPO Science	Foundations of Physics	2009
	CPO Science	Physics: A First Course	2009
	Glencoe	Glencoe Physics	2009
	Holt McDougal	Holt Physics	2009
	It's About Time	Active Chemistry	2007
	It's About Time	Active Physics	2010
	Kendall/Hunt (BSCS)	Science: An Inquiry Approach	2008
	LAB-AIDS Inc.	LAB-AIDS Chemistry	2010
	Pearson (Prentice Hall)	Conceptual Physics	2009

Appendix B. Review Instruments

Grades K-1		Date:	
Program:		Reviewer #:	

(Rate each item on the scale N-not covered, 1-brief mention, 2-somewhat covered, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: *Part-Whole Relationships*			
K-1 SYSA		① ② ③ ④	
K-1 SYSB		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: *Making Observations*			
K-1 INQA		① ② ③ ④	
K-1 INQB		① ② ③ ④	
K-1 INQC		① ② ③ ④	
K-1 INQD		① ② ③ ④	
K-1 INQE		① ② ③ ④	
K-1 INQF		① ② ③ ④	

EALR 3: Application (APP) – Core Content: *Tools and Materials*			
K-1 APPA		① ② ③ ④	
K-1 APPB		① ② ③ ④	
K-1 APPC		① ② ③ ④	
K-1 APPD		① ② ③ ④	

EALR 4: Physical Science - Force and Motion (PS1) – Core Content: *Push-Pull and Position*			
K-1 PS1A	Ⓝ	① ② ③ ④	
K-1 PS1B	Ⓝ	① ② ③ ④	
K-1 PS1C	Ⓝ	① ② ③ ④	
K-1 PS1D	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Matter: Properties and Change (PS2) – Core Content: *Liquids and Solids*			
K-1 PS2A	Ⓝ	① ② ③ ④	
K-1 PS2B	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth in the Universe (ES1) – Core Content: *Observing the Sun and Moon*			
K-1 ES1A	Ⓝ	① ② ③ ④	
K-1 ES1B	Ⓝ	① ② ③ ④	
K-1 ES1C	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth Systems, Structures, and Processes (ES2) – Core Content: *Earth Materials*			
K-1 ES2A	Ⓝ	① ② ③ ④	
K-1 ES2B	Ⓝ	① ② ③ ④	
K-1 ES2C	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Structures and Functions of Living Organisms (LS1) – Core Content: *Plant and Animal Parts*			
K-1 LS1A	Ⓝ	① ② ③ ④	
K-1 LS1B	Ⓝ	① ② ③ ④	
K-1 LS1C	Ⓝ	① ② ③ ④	
K-1 LS1D	Ⓝ	① ② ③ ④	
K-1 LS1E	Ⓝ	① ② ③ ④	
K-1 LS1F	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Ecosystems (LS2) – Core Content: *Habitats*			
K-1 LS2A	Ⓝ	① ② ③ ④	
K-1 LS2B	Ⓝ	① ② ③ ④	
K-1 LS2C	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Biological Evolution (LS3) – Core Content: *Classifying Plants and Animals*			
K-1 LS3A	Ⓝ	① ② ③ ④	
K-1 LS3B	Ⓝ	① ② ③ ④	
K-1 LS3C	Ⓝ	① ② ③ ④	

Grades 2-3		Date:	
Program:		Reviewer #:	

(Rate each item on the scale N-not covered, 1-brief mention, 2-somewhat covered, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: ***Role of Each Part in a System***			
2-3 SYSA		① ② ③ ④	
2-3 SYSB		① ② ③ ④	
2-3 SYSC		① ② ③ ④	
2-3 SYSD		① ② ③ ④	
2-3 SYSE		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: ***Conducting Investigations***			
2-3 INQA		① ② ③ ④	
2-3 INQB		① ② ③ ④	
2-3 INQC		① ② ③ ④	
2-3 INQD		① ② ③ ④	
2-3 INQE		① ② ③ ④	
2-3 INQF		① ② ③ ④	
2-3 INQG		① ② ③ ④	

EALR 3: Application (APP) – Core Content: ***Solving Problems***			
2-3 APPA		① ② ③ ④	
2-3 APPB		① ② ③ ④	
2-3 APPC		① ② ③ ④	
2-3 APPD		① ② ③ ④	
2-3 APPE		① ② ③ ④	

EALR 4: Physical Science - Force and Motion (PS1) – Core Content: *Force Makes Things Move*			
2-3 PS1A	Ⓝ	① ② ③ ④	
2-3 PS1B	Ⓝ	① ② ③ ④	
2-3 PS1C	Ⓝ	① ② ③ ④	
2-3 PS1D	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Matter: Properties and Change (PS2) – Core Content: *Properties of Materials*			
2-3 PS2A	Ⓝ	① ② ③ ④	
2-3 PS2B	Ⓝ	① ② ③ ④	
2-3 PS2C	Ⓝ	① ② ③ ④	
2-3 PS2D	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Energy: Transfer, Transformation, and Conservation (PS3) – Core Content: *Forms of Energy*			
2-3 PS3A	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth in the Universe (ES1) – Core Content: *The Sun's Daily Motion*			
2-3 ES1A	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth Systems, Structures, and Processes (ES2) – Core Content: *Water and Weather*			
2-3 ES2A	Ⓝ	① ② ③ ④	
2-3 ES2B	Ⓝ	① ② ③ ④	
2-3 ES2C	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Structures and Functions of Living Organisms (LS1) – Core Content: *Life Cycles*			
2-3 LS1A	Ⓝ	① ② ③ ④	
2-3 LS1B	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Ecosystems (LS2) – Core Content: *Changes in Ecosystems*			
2-3 LS2A	Ⓝ	① ② ③ ④	
2-3 LS2B	Ⓝ	① ② ③ ④	
2-3 LS2C	Ⓝ	① ② ③ ④	
2-3 LS2D	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Biological Evolution (LS3) – Core Content: *Variation of Inherited Characteristics*			
2-3 LS3A	Ⓝ	① ② ③ ④	
2-3 LS3B	Ⓝ	① ② ③ ④	
2-3 LS3C	Ⓝ	① ② ③ ④	
2-3 LS3D	Ⓝ	① ② ③ ④	
2-3 LS3E	Ⓝ	① ② ③ ④	

Grades 4-5		Date:	
Program:		Reviewer #:	

(Rate each item on the scale N-not covered, 1-brief mention, 2-somewhat covered, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: ***Complex Systems***			
4-5 SYSA		① ② ③ ④	
4-5 SYSB		① ② ③ ④	
4-5 SYSC		① ② ③ ④	
4-5 SYSD		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: ***Planning Investigations***			
4-5 INQA		① ② ③ ④	
4-5 INQB		① ② ③ ④	
4-5 INQC		① ② ③ ④	
4-5 INQD		① ② ③ ④	
4-5 INQE		① ② ③ ④	
4-5 INQF		① ② ③ ④	
4-5 INQG		① ② ③ ④	
4-5 INQH		① ② ③ ④	
4-5 INQI		① ② ③ ④	

EALR 3: Application (APP) – Core Content: *Different Technologies*			
4-5 APPA		① ② ③ ④	
4-5 APPB		① ② ③ ④	
4-5 APPC		① ② ③ ④	
4-5 APPD		① ② ③ ④	
4-5 APPE		① ② ③ ④	
4-5 APPF		① ② ③ ④	
4-5 APPG		① ② ③ ④	
4-5 APPH		① ② ③ ④	

EALR 4: Physical Science - Force and Motion (PS1) – Core Content: *Measurement of Force and Motion*			
4-5 PS1A	Ⓝ	① ② ③ ④	
4-5 PS1B	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Matter: Properties and Change (PS2) – Core Content: *States of Matter*			
4-5 PS2A	Ⓝ	① ② ③ ④	
4-5 PS2B	Ⓝ	① ② ③ ④	
4-5 PS2C	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Energy: Transfer, Transformation, & Conservation (PS3) – Core Content: *Heat, Light, Sound & Electricity*			
4-5 PS3A	Ⓝ	① ② ③ ④	
4-5 PS3B	Ⓝ	① ② ③ ④	
4-5 PS3C	Ⓝ	① ② ③ ④	
4-5 PS3D	Ⓝ	① ② ③ ④	
4-5 PS3E	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth in the Universe (ES1) – Core Content: *Earth in Space*			
4-5 ES1A	Ⓝ	① ② ③ ④	
4-5 ES1B	Ⓝ	① ② ③ ④	
4-5 ES1C	Ⓝ	① ② ③ ④	
4-5 ES1D	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth Systems, Structures, and Processes (ES2) – Core Content: *Formation of Earth Materials*			
4-5 ES2A	Ⓝ	① ② ③ ④	
4-5 ES2B	Ⓝ	① ② ③ ④	
4-5 ES2C	Ⓝ	① ② ③ ④	
4-5 ES2D	Ⓝ	① ② ③ ④	
4-5 ES2E	Ⓝ	① ② ③ ④	
4-5 ES2F	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science – Earth History (ES3) – Core Content: *Focus on Fossils*			
4-5 ES3A	Ⓝ	① ② ③ ④	
4-5 ES3B	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Structures and Functions of Living Organisms (LS1) – Core Content: *Structures and Behaviors*			
4-5 LS1A	Ⓝ	① ② ③ ④	
4-5 LS1B	Ⓝ	① ② ③ ④	
4-5 LS1C	Ⓝ	① ② ③ ④	
4-5 LS1D	Ⓝ	① ② ③ ④	
4-5 LS1E	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Ecosystems (LS2) – Core Content: *Food Webs*			
4-5 LS2A	Ⓝ	① ② ③ ④	
4-5 LS2B	Ⓝ	① ② ③ ④	
4-5 LS2C	Ⓝ	① ② ③ ④	
4-5 LS2D	Ⓝ	① ② ③ ④	
4-5 LS2E	Ⓝ	① ② ③ ④	
4-5 LS2F	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Biological Evolution (LS3) – Core Content: *Heredity and Adaptation*			
4-5 LS3A	Ⓝ	① ② ③ ④	
4-5 LS3B	Ⓝ	① ② ③ ④	
4-5 LS3C	Ⓝ	① ② ③ ④	
4-5 LS3D	Ⓝ	① ② ③ ④	

Grades 6-8		Date:	
Program:		Reviewer #:	

(Rate each item on the scale N-not covered, 1-brief mention, 2-somewhat covered, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: *Inputs, Outputs, Boundaries and Flows*			
6-8 SYSA		① ② ③ ④	
6-8 SYSB		① ② ③ ④	
6-8 SYSC		① ② ③ ④	
6-8 SYSD		① ② ③ ④	
6-8 SYSE		① ② ③ ④	
6-8 SYSF		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: *Questioning and Investigating*			
6-8 INQA		① ② ③ ④	
6-8 INQB		① ② ③ ④	
6-8 INQC		① ② ③ ④	
6-8 INQD		① ② ③ ④	
6-8 INQE		① ② ③ ④	
6-8 INQF		① ② ③ ④	
6-8 INQG		① ② ③ ④	
6-8 INQH		① ② ③ ④	
6-8 INQI		① ② ③ ④	

EALR 3: Application (APP) – Core Content: *Science, Technology, and Solving Problems*			
6-8 APPA		① ② ③ ④	
6-8 APPB		① ② ③ ④	
6-8 APPC		① ② ③ ④	
6-8 APPD		① ② ③ ④	
6-8 APPE		① ② ③ ④	
6-8 APPF		① ② ③ ④	
6-8 APPG		① ② ③ ④	
6-8 APPH		① ② ③ ④	

EALR 4: Physical Science - Force and Motion (PS1) – Core Content: *Balanced and Unbalanced Forces*			
6-8 PS1A	Ⓝ	① ② ③ ④	
6-8 PS1B	Ⓝ	① ② ③ ④	
6-8 PS1C	Ⓝ	① ② ③ ④	
6-8 PS1D	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Matter: Properties and Change (PS2) – Core Content: *Atoms and Molecules*			
6-8 PS2A	Ⓝ	① ② ③ ④	
6-8 PS2B	Ⓝ	① ② ③ ④	
6-8 PS2C	Ⓝ	① ② ③ ④	
6-8 PS2D	Ⓝ	① ② ③ ④	
6-8 PS2E	Ⓝ	① ② ③ ④	
6-8 PS2F	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Energy: Transfer, Transformation, & Conservation (PS3) – Core Content: *Interactions of Energy & Matter*			
6-8 PS3A	Ⓝ	① ② ③ ④	
6-8 PS3B	Ⓝ	① ② ③ ④	
6-8 PS3C	Ⓝ	① ② ③ ④	
6-8 PS3D	Ⓝ	① ② ③ ④	
6-8 PS3E	Ⓝ	① ② ③ ④	
6-8 PS3F	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science – Earth and Space (ES1) – Core Content: *The Solar System*			
6-8 ES1A	Ⓝ	① ② ③ ④	
6-8 ES1B	Ⓝ	① ② ③ ④	
6-8 ES1C	Ⓝ	① ② ③ ④	
6-8 ES1D	Ⓝ	① ② ③ ④	
6-8 ES1E	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science – Earth Systems, Structures, and Processes (ES2) – Core Content: *Cycles in Earth Systems*			
6-8 ES2A	Ⓝ	① ② ③ ④	
6-8 ES2B	Ⓝ	① ② ③ ④	
6-8 ES2C	Ⓝ	① ② ③ ④	
6-8 ES2D	Ⓝ	① ② ③ ④	
6-8 ES2E	Ⓝ	① ② ③ ④	
6-8 ES2F	Ⓝ	① ② ③ ④	
6-8 ES2G	Ⓝ	① ② ③ ④	
6-8 ES2H	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science – Earth History (ES3) – Core Content: *Evidence of Change*			
6-8 ES3A	Ⓝ	① ② ③ ④	
6-8 ES3B	Ⓝ	① ② ③ ④	
6-8 ES3C	Ⓝ	① ② ③ ④	
6-8 ES3D	Ⓝ	① ② ③ ④	
6-8 ES3E	Ⓝ	① ② ③ ④	

EALR 4: Life Science – Structures and Function of Organisms (LS1) – Core Content: *From Cells to Organisms*			
6-8 LS1A	Ⓝ	① ② ③ ④	
6-8 LS1B	Ⓝ	① ② ③ ④	
6-8 LS1C	Ⓝ	① ② ③ ④	
6-8 LS1D	Ⓝ	① ② ③ ④	
6-8 LS1E	Ⓝ	① ② ③ ④	
6-8 LS1F	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Ecosystems (LS2) – Core Content: *Flow of Energy Through Ecosystems*			
6-8 LS2A	Ⓝ	① ② ③ ④	
6-8 LS2B	Ⓝ	① ② ③ ④	
6-8 LS2C	Ⓝ	① ② ③ ④	
6-8 LS2D	Ⓝ	① ② ③ ④	
6-8 LS2E	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Biological Evolution (LS3) – Core Content: *Variation and Adaptation*			
6-8 LS3A	Ⓝ	① ② ③ ④	
6-8 LS3B	Ⓝ	① ② ③ ④	
6-8 LS3C	Ⓝ	① ② ③ ④	
6-8 LS3D	Ⓝ	① ② ③ ④	
6-8 LS3E	Ⓝ	① ② ③ ④	
6-8 LS3F	Ⓝ	① ② ③ ④	
6-8 LS3G	Ⓝ	① ② ③ ④	

Grades 9-12		Date:	
Program:		Reviewer #:	

(Rate each item on the scale N-not covered, 1-brief mention, 2-somewhat covered, 3-more than 50% addressed, 4-strongly covered)			
EALR 1: Systems (SYS) - Core Content: *Predictability and Feedback*			
9-12 SYSA		① ② ③ ④	
9-12 SYSB		① ② ③ ④	
9-12 SYSC		① ② ③ ④	
9-12 SYSD		① ② ③ ④	

EALR 2: Inquiry (INQ) – Core Content: *Conducting Analyses and Thinking Logically*			
9-12 INQA		① ② ③ ④	
9-12 INQB		① ② ③ ④	
9-12 INQC		① ② ③ ④	
9-12 INQD		① ② ③ ④	
9-12 INQE		① ② ③ ④	
9-12 INQF		① ② ③ ④	
9-12 INQG		① ② ③ ④	
9-12 INQH		① ② ③ ④	

EALR 3: Application (APP) – Core Content: *Science, Technology, and Society*			
9-12 APPA		① ② ③ ④	
9-12 APPB		① ② ③ ④	
9-12 APPC		① ② ③ ④	
9-12 APPD		① ② ③ ④	
9-12 APPE		① ② ③ ④	
9-12 APPF		① ② ③ ④	

EALR 4: Physical Science - Force and Motion (PS1) – Core Content: *Newton's Laws*			
9-11 PS1A	Ⓝ	① ② ③ ④	
9-11 PS1B	Ⓝ	① ② ③ ④	
9-11 PS1C	Ⓝ	① ② ③ ④	
9-11 PS1D	Ⓝ	① ② ③ ④	
9-11 PS1E	Ⓝ	① ② ③ ④	
9-11 PS1F	Ⓝ	① ② ③ ④	
9-11 PS1G	Ⓝ	① ② ③ ④	
9-11 PS1H	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Matter: Properties and Change (PS2) – Core Content: *Chemical Reactions*			
9-11 PS2A	Ⓝ	① ② ③ ④	
9-11 PS2B	Ⓝ	① ② ③ ④	
9-11 PS2C	Ⓝ	① ② ③ ④	
9-11 PS2D	Ⓝ	① ② ③ ④	
9-11 PS2E	Ⓝ	① ② ③ ④	
9-11 PS2F	Ⓝ	① ② ③ ④	
9-11 PS2G	Ⓝ	① ② ③ ④	
9-11 PS2H	Ⓝ	① ② ③ ④	
9-11 PS2I	Ⓝ	① ② ③ ④	
9-11 PS2J	Ⓝ	① ② ③ ④	
9-11 PS2K	Ⓝ	① ② ③ ④	

EALR 4: Physical Science - Energy: Transfer, Transformation, & Conservation (PS3) – Core Content: *Transformation & Conservation of Energy*			
9-11 PS3A	Ⓝ	① ② ③ ④	
9-11 PS3B	Ⓝ	① ② ③ ④	
9-11 PS3C	Ⓝ	① ② ③ ④	
9-11 PS3D	Ⓝ	① ② ③ ④	
9-11 PS3E	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth in the Universe (ES1) – Core Content: *Evolution of the Universe*			
9-11 ES1A	Ⓝ	① ② ③ ④	
9-11 ES1B	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science - Earth Systems, Structures, and Processes (ES2) – Core Content: *Energy in Earth Systems*			
9-11 ES2A	Ⓝ	① ② ③ ④	
9-11 ES2B	Ⓝ	① ② ③ ④	
9-11 ES2C	Ⓝ	① ② ③ ④	
9-11 ES2D	Ⓝ	① ② ③ ④	

EALR 4: Earth and Space Science – Earth History (ES3) – Core Content: *Evolution of the Earth*			
9-11 ES3A	Ⓝ	① ② ③ ④	
9-11 ES3B	Ⓝ	① ② ③ ④	
9-11 ES3C	Ⓝ	① ② ③ ④	
9-11 ES3D	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Structures and Functions of Living Organisms (LS1) – Core Content: *Processes Within Cells*			
9-11 LS1A	Ⓝ	① ② ③ ④	
9-11 LS1B	Ⓝ	① ② ③ ④	
9-11 LS1C	Ⓝ	① ② ③ ④	
9-11 LS1D	Ⓝ	① ② ③ ④	
9-11 LS1E	Ⓝ	① ② ③ ④	
9-11 LS1F	Ⓝ	① ② ③ ④	
9-11 LS1G	Ⓝ	① ② ③ ④	
9-11 LS1H	Ⓝ	① ② ③ ④	
9-11 LS1I	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Ecosystems (LS2) – Core Content: *Maintenance and Stability of Populations*			
9-11 LS2A	Ⓝ	① ② ③ ④	
9-11 LS2B	Ⓝ	① ② ③ ④	
9-11 LS2C	Ⓝ	① ② ③ ④	
9-11 LS2D	Ⓝ	① ② ③ ④	
9-11 LS2E	Ⓝ	① ② ③ ④	
9-11 LS2F	Ⓝ	① ② ③ ④	

EALR 4: Life Science - Biological Evolution (LS3) – Core Content: *Mechanisms of Evolution*			
9-11 LS3A	Ⓝ	① ② ③ ④	
9-11 LS3B	Ⓝ	① ② ③ ④	
9-11 LS3C	Ⓝ	① ② ③ ④	
9-11 LS3D	Ⓝ	① ② ③ ④	
9-11 LS3E	Ⓝ	① ② ③ ④	

Science Instructional Materials Evaluation – Program Coherence

Grade Range:	K-1 2-3 4-5 6-8 9-12	Date:	
Program:		Reviewer #:	

(Rate each item on the scale 1-Not Evident, 2-Somewhat Evident, 3-Mostly Evident, 4-Strongly Evident)		
1.	Program presents content in an organized and deliberate sequence designed to develop conceptual understanding.	① ② ③ ④
2.	Program includes the big ideas of science and makes them explicit.	① ② ③ ④
3.	Program is organized into units, modules or other structures that allow students sufficient time to develop deep understanding of a few concepts.	① ② ③ ④
4.	Program provides opportunities for students to apply understanding to new situations, to relate material to real-world experiences and situations, and to draw connections between personal and classroom	① ② ③ ④

	experiences.	
5.	Program promotes interdisciplinary and cross-curricular connections.	① ② ③ ④
6.	Program contains substantial extraneous material outside of expected grade level standards.	① ② ③ ④

Science Instructional Materials Evaluation – Key Program Elements

Grade Range:	K-1 2-3 4-5 6-8 9-12	Date:	
Program:		Reviewer #:	

(Rate each item on the scale 1-Not Evident, 2-Somewhat Evident, 3-Mostly Evident, 4-Strongly Evident)

Student Learning

1.	The program provides authentic learning experiences that demonstrate the work of scientists as they use evidence to solve problems in the context of real-world applications.	① ② ③ ④
2.	The program utilizes a variety of relevant and engaging materials and strategies to involve students in learning.	① ② ③ ④
3.	Student learning goals are clearly defined within the unit and lesson.	① ② ③ ④
4.	Students engage in a variety of inquiry experiences (e.g. observations, field studies, models, open-ended explorations, and/or conducting controlled scientific investigations).	① ② ③ ④
5.	Students communicate learning in multiple ways (e.g. charts, graphs, tables, technology, presentation, etc.).	① ② ③ ④
6.	Students use evidence to generate explanations and support conclusions.	① ② ③ ④

Facilitating Instruction

1.	Program provides background information for teachers, including an instructional learning model; content, process, & instructional method background; commonly held student ideas; and cognitive prompts.	① ② ③ ④
2.	Program is based on current learning research in “How People Learn”.	① ② ③ ④
3.	Program provides methods for supporting diverse learners and a variety of learning styles.	① ② ③ ④
4.	Program includes background information and suggested teaching strategies for the abilities of inquiry.	① ② ③ ④
5.	Program provides a variety of resource materials, such as CDs / DVDs, websites and other multi-media, and guides instructors in how to integrate these materials into the classroom.	① ② ③ ④
6.	Program guides the use of lab materials & equipment.	① ② ③ ④

Equity and Accessibility

1.	The program provides methods and accommodations for differentiating instruction based on individual & cultural differences, disabilities, gifted / talented students, ELL, and students in poverty.	① ② ③ ④
2.	Materials accommodate a variety of learning styles.	① ② ③ ④
3.	Materials accommodate different levels of language proficiency and are available in a variety of languages.	① ② ③ ④
4.	Materials contain racial/ethnic/gender/disability balance in reference to individuals, groups, and in illustrations.	① ② ③ ④
5.	Differing racial/ethnic group references in the materials reflect like qualities such as leadership, imagination, and the ability to perform similar work.	① ② ③ ④
6.	Male and female references in the materials reflect like qualities such as leadership, imagination, and the ability to perform similar work.	① ② ③ ④

Assessment

1.	Assessments cause students to surface, express, clarify, and justify their ideas and prior conceptions.	① ② ③ ④
2.	The materials provide teachers with specific tools to score and analyze assessments, as well as teacher support on how to use assessments to provide feedback to students and to make instructional decisions.	① ② ③ ④

3.	The materials provide opportunities for students to reflect and monitor their own understanding.	① ② ③ ④
4.	Assessment items align with big ideas, and assess specific ideas that support understanding of the big ideas.	① ② ③ ④
5.	Materials include assessment tasks that require the application of familiar ideas through novel tasks at the same level of sophistication as the familiar tasks.	① ② ③ ④
6.	Teachers are encouraged to regularly assess student thinking using a variety of assessment strategies.	① ② ③ ④

Appendix C. Acknowledgements

We are indebted to the volunteers who thoughtfully assisted in conducting the 2009 basic science instructional materials review. Hundreds of people contributed toward the success of the project. Many are listed below. We wish to acknowledge countless others who provided input into the process – parents, teachers, district administrators, business and technical leaders, scientists, and other concerned individuals who shared their ideas and feedback on the process and results. The reviewers endeavored to apply the scoring criteria objectively and with a commitment to providing a quality resource to school districts looking for guidance. All the contributors devoted many hours and/or days out of their busy schedules to do this work. We are grateful for their efforts.

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