

Recommendations for Selection of New Instructional Materials for:

Chemistry 1 / Physics 1

Textbook request for:

Author: Feather, McLaughlin, Thompson, and Zike
Publisher: Glencoe/McGraw-Hill
Copyright Date: 2009
Titles: Physical Science with Earth Science

Date: April 4, 2009

Program/Course Identification Information

(New Textbook adoption)

- **Course Name**

Chemistry 1/Physics 1

- **Number of students this recommendation will impact**

Annually, based on following estimate:

- Chemistry 1 and Physics 1:
 - 9 sections of 30 students each 270 students
 - 5-year Total 1350 students

- **Grade level, number of teachers**

Physics 1: 4.5 sections @ 2-3 sections per teacher
Total: 2 Teacher

Chemistry 1 4.5 sections @ 2-3 sections per teacher
Total: 2 Teachers

- **Textbook Information – Chemistry 1 and Physics 1**

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- **Description of Proposed Materials**

Glencoe ***Physical Science with Earth Science*** provides students content coverage of physical science integrated with Earth science. This program brings together Physics, Chemistry, Earth science, space science, and mathematics. This textbook program will be used for a Physics 1 and Chemistry 1 non-honors course to be taught in the 9th grade. However it will also include material used in 8th grade science as that can be tied into the 9th grade science experience.

Materials Description

- **What needs will be met by these materials?**

These materials will provide curriculum support that matches both state and district learning targets. The textbook and supporting materials provide student and teacher lead inquiry activities, application of knowledge opportunities, incorporation and exploration of technology, methodical approaches to understanding and applying systems, and scaffolding to build in *Habits of Mind*, a model of thinking that is being incorporated into the Science Curriculum district wide. The current 1997 edition of Glencoe's *Chemistry: Concepts and Applications* only covers chemistry and not physics. This old textbook program does not provide the appropriate support with supplemental technology and lacks an appropriate reading level for all 9th grade students.

- **How are these materials aligned with the EALRs and the District Targets?**

Physical Science with Earth Science is a **High School** textbook. The text covers District Learning Targets and state EALRs for Physical Science. It is written at an appropriate level for students entering the course from any 8th/9th Grade Science Curriculum. The textbook comes with laboratory activities which can be implemented in the classroom. Each chapter in the textbook includes extensive problem sets, along with step-by-step instruction in problem-solving skills. There are also numerous on-line applications that complement each topic, which addresses district technology targets.

- **What is the content of the course/program for which these materials are proposed?**

The materials are proposed for semester long general Chemistry and Physics courses ideally taken during a student's 9th grade year.

- **Physics 1 Topics:**

Waves, Sound, Light and Astronomy, Investigation/Data Analysis, Ethics in Science, One-Dimension Motion, Forces, Energy and Simple Machines

- **Chemistry 1 Topics:**

Classification of Matter, Properties of the Atom, the Periodic Table, Chemical Bonds, Chemical Reaction, Physical Changes of Matter, Solutions, Acids and Bases, Nuclear Changes

- **How do these materials allow students to demonstrate mastery of the Grade Level Expectations or District Targets?**

In addition to providing critical support to concepts taught in the Physics 1 and Chemistry 1 classes, the textbook comes with laboratory activities which can be implemented in the classroom. Each chapter in the textbook includes extensive problem sets, along with step-by-step instruction in problem-solving skills. There are also numerous on-line applications that complement each topic, which addresses district technology targets.

- **What is the relationship of these materials to other materials in use in the department and school?**

Physics 1 and Chemistry 1 are laboratory classes. There are several lab activities for each unit of study that can augment or replace current lab experiences. The textbook will complement hands-on activities and demonstrations performed in the classroom. Supplemental material includes Demonstration and Laboratory CD ROMS that can interface with the current technology that is already in use. The current textbook supplemental materials have very little technological interactions and the Audio Visual options are outdated and unuseful (example overheads and 3 inch floppy discs).

Implementation and Associated Costs

- Describe the staff development/training necessary to implement these materials
-Include a timeline for implementation

For the first year of implementation, all teachers teaching Physics 1 and Chemistry 1 will meet twice a month to discuss objectives, pacing of lessons, and to share with others what works/doesn't work. Teachers that have taught Phys1/Chem1 courses in the past will participate in these meetings to help new teachers plan appropriate time lines for each concept being developed.

A total of 4 teachers will need approximately 10 hours each of paid planning and meeting time. This is based on previous adoptions of paying each teacher 2hr/ month for 8 months for planning/meeting time.

Planning/meeting time: 4 teachers x 10 hrs.

- Number and costs of materials

Student Books	sections of Phys1/Chem1
Student roll up from Alg2:	270
Classroom sets (2):	60
"Extra" for medical, resource, etc.:	25
Total:	355

- Number and costs of supplemental/associated materials

- Materials for 5 teachers (2 chemistry, 2 physics, 1 extra set for adjusting enrollment or replacements of materials)

Laboratory Manual, Student Edition (SE)	5
Mastering Standardized Tests SE	5
Mathmatics Skills Activities SE	5
Probeware Lab Manual SE	5
Reading and Writing Skills Activities SE	5
Reading Essentials SE	5
Science Inquiry Lab Manual SE	5
Science Notebook SE	5
Study Guide and Reinforcement	5
Teacher Wraparound Edition	5
Teacher Classroom Resources	5
Teacherworks Plus CD-ROM	5
Studentworks Plus CD-ROM	5
Examview Assessment Suite CD-ROM	5
Virtual Labs CD-ROM	5

Annual operating expenses

- **What are the ongoing annual operating costs necessary to support this adoption?**

Possible operating costs will include the purchase of additional textbooks as student numbers may increase. This should be addressed on a yearly basis in preparation for incoming classes. Also, the replacement of textbooks due to damage, loss, or theft must be considered.

- **What are the sources of funding to meet the ongoing operational costs?**

Damage, loss, and theft should be addressed by students responsible for the textbooks. Sources of funding for additional textbooks would have to come from the MISF, building funds, and/or other district funds. The science department at MIHS does not have the funds for textbook purchases.

Evaluation Process

Criteria used to evaluate the materials:

The chemistry and physics teachers in the science department examined a variety of high school 9th grade science textbooks and selected the best 7 for a more thorough evaluation by students, parents, and teachers. Note that several of the textbooks were physics or chemistry only.

There were several criteria used to evaluate the seven textbooks under consideration. A district evaluation rubric for teachers was modified by the science department to include the following criteria.

The textbook for the physics and chemistry courses should:

- Address the WA State GLE's in content, skills to do scientific inquiry, and application of skills and knowledge to design solutions to human problems/challenges.
- Provide balance of content, teacher-directed inquiry, and student-led inquiry.
- Provide opportunity for students to address Habits of Mind: tenacity, skepticism, curiosity, and reflection. These habits of mind were identified by the 6-12 District Science Review Committee as the most applicable to middle and high school scientific learning.
- Address depth as well as breadth.
- Incorporate hand-on experiences, higher-level thinking skills, and activities that stimulate student participation and critical thinking.
- Foster application of course concepts and skills to the real world.
- Be at an appropriate reading level for the intended grade.
- Be supported by a variety of useful supplemental materials, including availability on CD-ROM
- Include instructional materials that support a variety of learning styles, abilities, and ELL students.
- Provide high-quality tools that encourage and support multiple methods of formal and informal assessment.
- Provide diagrams and illustrations that engage and challenge students.

- Have an organizational structure that makes sense and is teachable.
- Be visually pleasing to students, including appropriate font styles, use of color, length of chapters, photos, graphs, and highlighted concepts and vocabulary.
- Have an engaging layout that is not distracting.
- Be well-bound, durable, and portable.
- Expose students to positive examples of human diversity (socio-economic, gender, ethnicity, abilities)

Students completed a shorter rubric that included the following criteria:

- Clearly written text
- Informative text
- Helpful diagrams and pictures
- Helpful example problems and solutions
- Asides are relevant and clear
- Usefulness of online applications

Results of the textbooks evaluation process:

Both the Chemistry and Physics teachers evaluated the selection of textbooks. However, the textbooks that focused specifically physics or chemistry were reviewed by those teachers that specialized in those subject areas. The books that contained both chemistry and physics content were evaluated by both physics and chemistry teachers. However each subject area focused on units within the textbooks that would most likely be used in that course.

In addition, the following filled out evaluation rubrics that were used in the process:

- 23 Physics 1 students
- 22 Chemistry 1 students
- 3 Special Ed teachers and paraprofessionals
- 7 Biology students that had already taken both Chemistry 1 and Physics 1. These students are in the Exploring Biology course. This course is designed for students that have traditionally struggled in school, specifically science during their 9th grade year.

Book (Publisher)	Weaknesses identified by teachers	Weaknesses identified by students
<i>Physics</i> (Holt)	<ul style="list-style-type: none"> ▪ Reading level is too high for freshmen (11th grade reading level) ▪ Instructional materials do not adequately support diverse learners ▪ Pictures/Diagrams is not engaging ▪ Text is not engaging ▪ In general, the book is geared to too high a level for a freshman class 	<ul style="list-style-type: none"> ▪ Text is too confusing ▪ Pictures/diagrams not helpful
<i>Physics: Principles and Problems</i> (Glencoe)	<ul style="list-style-type: none"> ▪ Layout can be a little distracting ▪ Text is dense, which is less appealing 	<ul style="list-style-type: none"> ▪ Asides not very relevant
<i>Conceptual Physics</i> (Prentice Hall)	<ul style="list-style-type: none"> ▪ Lacks detailed lab investigations in the text ▪ Lacks global human problems that are part of WA state GLE's ▪ Is mostly text-led inquiry and lacks student-led inquiry ▪ Lacks depth, especially mathematical depth. ▪ Provides little for further exploration of topics beyond basic curriculum; some major topics are not covered in enough depth ▪ Pictures/Diagrams are engaging, but not challenging ▪ Informal assessments are good, but lacks much formal assessment material 	<ul style="list-style-type: none"> ▪ Example problems not helpful ▪ Asides not very relevant
<i>Physical Science: Concepts in Action</i> (Prentice Hall)	<ul style="list-style-type: none"> ▪ Lack of relevance with the diagrams ▪ Sample problems were unclear. ▪ Lacked some key components of content. 	<ul style="list-style-type: none"> ▪ Although students preferred the diagrams in this book the written language was less clear and confusing.
<i>Chemistry</i> (Prentice Hall)	<ul style="list-style-type: none"> ▪ The reading level of this book is for 11th and 12th grade science classes. ▪ The depth and math concepts are too advanced for these courses 	<ul style="list-style-type: none"> ▪ Difficult content and unfamiliar language
<i>Chemistry: Matter and Change</i> (Glencoe)	<ul style="list-style-type: none"> ▪ The reading level of this book is for 11th and 12th grade science classes. ▪ The depth and math concepts are too advanced for these courses 	<ul style="list-style-type: none"> ▪ Difficult content and unfamiliar language

Glencoe's *Physical Science with Earth Science* met the criteria used by the science teachers in all categories. On average students did not rank the Glencoe text lower than a 3 (neutral) in any of the criteria that they were using. The particular strengths of the Glencoe physics text compared to the other texts are summarized in the following table:

Book (publisher)	Strengths identified by teachers	Strengths identified by students
Physical Science with Earth Science (Glencoe)	<ul style="list-style-type: none"> ▪ Preferred by the special education teachers and paraprofessionals due to the readability. ▪ Concepts were fairly clear ▪ Covers all the content required by the district and state ▪ Covers all the possible content needed in these courses 	<ul style="list-style-type: none"> ▪ Rated book highest in the "informative text" category ▪ Rated book highest in helpful diagrams and pictures category

14. Evaluation of materials and student outcomes if materials are adopted:

Physics 1 and Chemistry 1 are adjusted courses from the current Physics 1 and Chemistry 1 courses. With the introduction of honors courses for 9th grades science, these classes are meant to serve students in a non-honors capacity. Therefore, we will not have any past data to compare student achievement in these courses. We can use similar performing students indicated by WASL scores to compare on unit assessments