2024 Instructional Material Summer Review Institute

Review Team Appraisal of Title

Grades 9-12 Physics

This appraisal form is provided for use by educators responsible for the selection of instructional materials for implementation with districts and charter schools across New Mexico to meet the need of their student populations.

NMPED Adoption Information

Text Title	Physics of the Universe	Publisher	BIOZONE Corporation
SE ISBN	9781927309759	TE ISBN	9781927309780
SW ISBN		Grade Level/Content	Grades 9-12 Physics

Core Instructional Material Designation *(Core Instructional Material is the comprehensive print or digital educational material, including basal material, which constitutes the necessary instructional components of a full academic course of study in those subjects for which the department has adopted content standards and benchmarks.)*

Recommended (90% and above)	☐	**Recommended with Reservations** (80-89%)	☑	**Not Recommended and Not Adopted** (below 80%)	☐

Total Score - *The final score for the materials is averaged between the team of reviewers.*

Average Score
80%

Cultural and Linguistic Relevance Recognition - *Materials are reviewed for relevant criteria pertaining to the support for teachers and students in the material regarding cultural relevance and the inclusion of a culturally responsive lens. Those materials receiving a score of 90% or above on the CLR portion of the review are recognized as culturally and linguistically relevant.*

CLR Recognized ☐

Average Score
33%

FOCUS AREA 6: CULTURAL AND LINGUISTIC PERSPECTIVES
Instructional materials represent a variety of cultural and linguistic perspectives.
Statements of appraisal and supporting evidence:

There is no mention of cultural or linguistic considerations in the materials. The materials do not offer scaffolding for differentiation based on varying proficiencies in English language comprehension. The text does not share any first person perspectives and maintains an academic perspective that does not address culture or language.

FOCUS AREA 7: INCLUSION OF CULTURALLY AND LINGUISTICALLY RESPONSIVE LENS
Instructional materials highlight diversity in culture and language through multiple perspectives.
Statements of appraisal and supporting evidence:

Cultures and languages are not presented in the materials, which focuses purely on presentation of physics instruction. There is no scaffolding or teacher support for teaching this material to students who are English learners/emergent bilinguals. There are no images of or mentions of specific people, regardless of culture, included in the text. The exception to this is the study of famous scientists such as Sir Isaac Newton.

Science Standards Review - *Materials are reviewed for alignment with the state adopted content standards, benchmarks and performance standards. The science standards include the performance expectations (PEs), disciplinary core ideas (DCIs), science and engineering practices (SEPs), crosscutting concepts (CCCs), and connections (CONNs) of the Next Generation Science Standards (NGSS). They also include the six NM StemReady! science standards.*

Average Score
82%

OVERALL ALIGNMENT
Materials align with the science standards overall.
Statements of appraisal and supporting evidence:

The materials align with the physics standards that the New Mexico Department of Public Education outlines for science. The materials include activities, illustrations, trivia, formative and summative tests, practical investigations, resource hubs for students and teachers, science and engineering practices, and crosscutting concepts for the topics including Forces and Motion, Forces at a Distance, Energy Conservation and Renewable Energy, Nuclear Processes and Earth History, Waves and Electromagnetic Radiation, and Stars and the Origins of the Universe.

FORCES AND INTERACTIONS
Materials align to the physical science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.
Statements of appraisal and supporting evidence:

These materials align with the physical science performance expectations and related components in regard to forces and interactions. The materials cover topics such as motion, forces, Newton's law of motion, momentum, gravity, planetary motion, electrostatic force, atomic structure and bonding, and magnetism.

ENERGY
Materials align to the physical science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.
Statements of appraisal and supporting evidence:

This resource aligns with the physical science performance expectations and related components in the area of energy. The materials include daily discussions and activities on electricity, power plant operations, electricity generation, light-to-electricity conversion, and assessment of renewable power plants, engineering, energy conversion devices, and wind energy. The materials also include formative and summative tests.

WAVES AND ELECTROMAGNETIC RADIATION
Materials align to the physical science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.
Statements of appraisal and supporting evidence:

The materials are aligned with the given PsE, DCIs, SEPs, CCCs, CONNs, and NM standards. The materials include anchoring phenomena of rebuilding after the damage caused by a Mexico City earthquake, for example. The materials explain the nature of waves, earthquake waves, and the nature of light waves and compare solar and conventional power, conductors and insulators, diffraction, the dual nature of light, and the photoelectric effect and technology. A summative assessment follows. Throughout the material on 'waves and electromagnetic radiation', the use of images/visuals, graphing, mathematical equations, and data tables is employed. The materials help to connect to real-world or natural phenomena like halos, rainbows, sundogs, and cloud iridescence. The material urges students/teachers to use technology to evaluate the topic of electromagnetic waves and technology. The topic 'waves and electromagnetic radiation' ends with a summative assessment.

SPACE SYSTEMS
Materials align to the earth and space science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.
Statements of appraisal and supporting evidence:

The materials are aligned with the given PEs, DCIs, SEPs, CCCs, CONNs, and NM standards related to space systems. The materials include topics on the structure of the sun, nucleosynthesis, space weather, radioactive decay, nuclear energy, Einstein's equation, energy production in the core of stars, age and size of stars, formation of stars, death of stars, origin of the universe, shape of the universe, size of the universe, doppler effect, motion of galaxies, expanding universe, cosmic background radiation, the composition of early galaxies and stars, Olber's paradox and Big bang theory. The materials use an investigation modeling the expansion of the universe, an investigation to measure the diameter of the sun, and an investigation on a computational model of orbits. The activity to measure the diameter of the sun allows students to make connections to real-life or natural phenomena. Throughout the material, mathematics is used to solve problems like how long the sun will burn hydrogen during the redshift of the given galaxies, the temperature of the stars using the Wien Displacement Law, isotopes of Uranium, Kepler's laws, and orbital speed of satellites. The use of visuals, including graphs and images/pictures, helps readers to understand the material. Formative assessments are embedded throughout the material, and summative assessments can be seen at the end of the unit.

HISTORY OF EARTH

Materials align to the earth and space science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.

Statements of appraisal and supporting evidence:

The materials include topics such as hydroelectricity, the rocks of the earth, the age of the rocks, cycling of the crust, the processes that shape the earth, radiometric dating, early models of the earth, dating earth rocks and evidence, and dating the formation of the earth. The materials use color coding in visuals supporting topics like the age of rocks, cycling of the crust, mid-oceanic ridge, rock cycle, and potassium-argon dating. They use scatter plots and graphs involved in dating the Earth's formation and isotopes of oxygen. Formative assessments are seen throughout the material, and summative assessments are seen at the end of the unit. The materials encourage students to use mathematics to solve problems related to half-life. The materials allow students to connect the topic half-life to roll dice in an activity on 'half-lives 2'.

EARTH'S SYSTEMS

Materials align to the earth and space science performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.

Statements of appraisal and supporting evidence:

The materials align with NM content standards, benchmarks, and performance standards, including the PEs, DCIs, SEPs for Earth's Systems. Topics covered include forces of the earth and interactions of forces in creation of faults and mountains. Earth's gravity is explored and derived. Newton's Laws are applied to Earth systems and processes. Earth's orbit is explored. Each unit is based on the 5 Es (Engage, Explore, Explain, Elaborate, and Evaluate); students engage with the text through reading passages, investigations, graphing, use of mathematical formulas where appropriate, computer modeling, and formative and summative assessments.

ENGINEERING DESIGN

Materials align to the engineering design performance expectations (PEs) and related components (DCIs, SEPs, CCCs, CONNs, and NM Standards) for this focus area.

Statements of appraisal and supporting evidence:

The materials align with NM content standards, benchmarks, and performance standards, including the PEs, DCIs, SEPs for Engineering Design. Topics covered include building bridges, interaction of pressure, support force, compressive strength, and hands-on practice building a bridge. There is a focus on engineering and forces, crash landings, landings in space, crumple zones and crash helmets. The materials elucidate the process of engineering with a given specification in mind. Each unit is based on the 5 Es; content is presented through reading passages, investigations, graphing, mathematical formulas where appropriate, computer modeling, and formative and summative assessments.

CCSS for ELA and Math in Grades 9-12 NGSS

Materials align to the ELA and math standards identified in grades 9-12 Physics NGSS.

Statements of appraisal and supporting evidence:

The materials align with NM content standards, benchmarks, and performance standards related to CCSS for Math in grades 9-12, NGSS as adopted by the New Mexico Public Education Department. The text integrates mathematics into each unit where appropriate, including units covering topics of "Forces and Motion", "Forces at a Distance", "Energy Conversion and Renewable Energy", "Nuclear Processes and Earth History", "Waves and EM Radiation", and "Stars and the Origin of the Universe". There is a section on basic numerical skills used in physics as a refresher. There are sections in the materials aligned to ELA standards like reading, writing, speaking, listening and even spelling used in physics as a refresher.

Science Content Review- *Materials are reviewed against relevant criteria pertaining to the support for teachers and students in the specific content area reviewed.*

Average Score
98%

FOCUS AREA 1: PHENOMENA-/PROBLEM-BASED AND THREE-DIMENSIONAL APPROACH
Instructional materials are centered around high quality phenomena and/or problems and require a three dimensional approach to make sense of the phenomena or to solve the problems.

The instructional materials are centered around high-quality phenomena and/or problems and require a three-dimensional approach to make sense of the phenomena or to solve the problems, as shown on all the pages containing the "practical investigations" part of the material.

FOCUS AREA 2: THREE-DIMENSIONAL ASSESSMENT
Assessments provide tools, guidance and support for teachers to collect, interpret and act on data about student progress toward the learning goals of the 3 dimensional standards.

The instructional materials include both formative and summative assessments for each chapter. Each test is accompanied by models, illustrations, case analyses, and practical investigation-based activities. The materials provide teachers with tools, guidance, and support for collecting, interpreting, and utilizing student progress data toward the learning goals of the three-dimensional standards through the activities presented, practical investigations, 5Es, and full-colored models.

FOCUS AREA 3: TEACHER SUPPORTS
Materials include opportunities for teachers to effectively plan and utilize materials.

The materials allow teachers to use the appendix section to find the list of supplies needed for investigations given in the material. The materials provide guidance that enables teachers to use technology for each lesson. The documents allow teachers to monitor student progress through the use of checkboxes and sample answers provided in the teacher edition.

FOCUS AREA 4: STUDENT CENTERED INSTRUCTION
Materials are designed for each student's regular and active participation in science content.

The materials enable students to start a topic with the use of anchoring phenomena that are connected to real life. The structure of each chapter follows a progression of engage, explore, explain, elaborate and evaluate (The 5E Model), which guides students to self-assess their learning through formative assessment and summative assessments.

FOCUS AREA 5: EQUITY
Materials are designed for all learners.

These materials are designed for a traditional, mainstream classroom, in which students are proficient in reading and writing in the English language and are on grade level in math. Unit extensions are available for students who may work quickly or display a high level of understanding. There are no scaffolds for differentiating materials for varied levels of English language proficiency, or for students with special needs / learning challenges.

All Content Review - *Materials are reviewed against relevant criteria pertaining to the support for teachers and students in the material regarding the progression of the standards, lesson structure, pacing, assessment, individual learners and cultural relevance.*

Average Score
64%

FOCUS AREA 1 COHERENCE:
Instructional materials are coherent and consistent with the New Mexico Content Standards that all students should study in order to be college- and career-ready.
Statements of appraisal and supporting evidence:

The instructional materials offer consistent and coherent learning opportunities that align with the New Mexico Content Standards. However, they do not include activities to support the needs of culturally diverse English learners and students with special needs in preparation for their future careers.

FOCUS AREA 2 WELL-DESIGNED LESSONS:
Instructional materials take into account effective lesson structure and pacing.
Statements of appraisal and supporting evidence:

The instructional materials are well-organized, featuring comprehensive lesson planning resources such as classroom guides and flow charts. Each chapter includes an introduction, practical investigations, a resource hub, a tab system, and instructional segments, which all aid in creating an effective lesson structure and pacing for teachers. The materials do not include provisions or activities to support the needs of culturally diverse students, English learners and students with special needs, which are essential in ensuring that all students are prepared for their future careers.

FOCUS AREA 3 RESOURCES FOR PLANNING:
Instructional materials provide teacher resources to support planning, learning, and understanding of the New Mexico Content Standards.
Statements of appraisal and supporting evidence:

The material uses 'red flag' as an indicator of the need to have teacher guidance for the given activity. The instructional materials provide opportunities for students to integrate learning with technology. The material does not show the amount of instructional time that needs to be spent on each standard or chapter.

FOCUS AREA 4 ASSESSMENT:
Instructional materials offer teachers a variety of assessment resources and tools to collect ongoing data about student progress related to the standards.
Statements of appraisal and supporting evidence:

The material uses formative assessments in the form of questions to evaluate student progress. The use of graphs and digital technology in activities or investigations throughout the materials helps students to link technology to the given content. The formative assessment given at the end of each chapter supports the assessment process. The material does not provide alternate assessments for English learners, culturally and linguistically diverse learners, advanced students, or students with special needs. There is no evidence in the material that suggests opportunities for further instruction, differentiation, or remediation/acceleration.

FOCUS AREA 5 EXTENSIVE SUPPORT:
Instructional materials give all students extensive opportunities and support to explore key concepts.
Statements of appraisal and supporting evidence:

The materials are extensive, and include access to a website on which materials for teachers and students are available including teacher slideshows, additional videos and resources, printable worksheets, articles, etc. The materials contain a multilayered approach to teaching and learning, including guiding students through graphing, reading passages throughout experiments, in-class hands-on investigations, computer modeling, research projects and presentations. Formative and summative assessments are available for all units. There is no assistance for teachers who would like to adjust the level of a unit, or to differentiate the assignments and assessments for learners of varied levels. The student edition is a write-in consumable workbook, in which each page is present as-is and is not customizable by the teacher in order to adjust for student understanding or ability.

FOCUS AREA 6 CULTURAL AND LINGUISTIC PERSPECTIVES:
Instructional materials represent a variety of cultural and linguistic perspectives.
Statements of appraisal and supporting evidence:

There is no mention of cultural or linguistic considerations in the materials. The materials do not offer scaffolding for differentiation based on varying proficiencies in English language comprehension. The text does not share any first person perspectives and maintains an academic perspective that does not address culture or language.

FOCUS AREA 7 INCLUSION OF CULTURALLY AND LINGUISTICALLY RESPONSIVE LENS:
Instructional materials highlight diversity in culture and language through multiple perspectives.
Statements of appraisal and supporting evidence:

Cultures and languages are not presented in the materials, which focuses purely on presentation of physics instruction. There is no scaffolding or teacher support for teaching this material to students who are English learners/emergent bilinguals. There are no images of or mentions of specific people, regardless of culture, included in the text. The exception to this is the study of famous scientists such as Sir Isaac Newton.

Reviewers' Professional Summary - *These materials are reviewed by Level II and Level III educators from across New Mexico. The reviewers have brought their knowledge, experience and expertise into the review of these materials. They offer here their individual summary of the material as a whole.*

Reviewer #: 76

Background and experience:

I am a Level 3A licensed teacher in New Mexico with endorsements in science, CTE, business education, and TESOL. I have 22 years of teaching experience in high school, college, and graduate school. Additionally, I hold master's degrees in school administration and supervision, natural sciences, and special education, as well as a PhD in educational management. I am a published author and have received several national and international teaching awards.

Professional summary of material:

This material is a comprehensive and interdisciplinary physics book in print and digital formats. It covers the Physics standards set by the New Mexico Public Education Department. The topics include forces and motion, forces at a distance, energy conversion and renewable energy, nuclear processes and earth history, waves and electromagnetic radiation, stars and origins of the universe, and basic skills for physics students. These topics will be taught using the Five E Approach to provide a beneficial learning experience for each student. The equipment and resources are listed in an organized manner so that teachers can quickly locate them. Formative and summative tests and practical investigation activities will make the lessons engaging and effective. However, there is no provision that will support English learners with diverse cultural backgrounds and children with special needs so they can be ready for their future careers.

Reviewer #: 77

Background and experience:

I am a high school dual credit Physics teacher with 11 years of teaching experience. I hold a Bachelor's Degree in Physics, Master's Degree in Physics, and an Educational Doctorate (EdD) in Leadership with emphasis on Curriculum and Instruction.

Professional summary of material:

The textbook "Physics of the Universe" aligns with the NM standards. The use of anchoring phenomena as an introduction to every chapter helps students to connect the topic/content to real life. The material provides access to online content that supports the activities given in the textbook. The textbook enables students to use technology to integrate with the learning. The use of visuals/pictures and graphs helps all students gain an understanding of the topic under consideration. The textbook uses mathematical equations to interpret the given quantity or phenomena wherever applicable. The textbook is designed with activities that enable learners to engage, explore, explain, elaborate, and finally assess the topic to be learned. The textbook does not show provisions for differentiation or connections to New Mexico's culturally diverse and English learners.

Reviewer #: 78

Background and experience:

I hold an MS and PhD in Mineral Physics and a BS in Geosciences. I am a Level 3A AP and Gen Ed Physics teacher, endorsed in science, with 4 years high school teaching experience, 20 years experience teaching courses and leading graduate research associates at the university level, and 6 years experience in curriculum development for adult learners in the online education space. I am the author of three books and multiple published scientific articles and research papers.

Professional summary of material:

The print materials (books) and the accompanying online materials offer a phenomenon-based approach, which aligns with standards adopted by the New Mexico Public Education Department. Teachers and students are scaffolded throughout the text in a 5 E instructional model that is segmented into discrete units that take students from the introduction of the phenomena through in-depth activities like developing computer models, performing hands-on investigations, collecting data, graphing, and interpreting that data. Students explore concepts like Newton's Laws empirically and mathematically. Diagrams are clear, full-color, and look modern and up-to-date. The book is formatted to be clear and easy for students to follow. The student edition is a one-time use, write-in workbook. Teacher materials are supplemented online with additional printable PDF handouts, slide presentations, videos, and more. Books are also available as online versions. No mention is given of the state of New Mexico, and no supports are given for teachers who may need to differentiate for students who are English learners/emergent bilinguals, or for students with learning disabilities or special needs. The book does not address cultural and linguistic responsiveness nor present material from varying cultural perspectives. The material is presented in an academic manner, with very little personal perspective or cultural representation.