Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

1. Provide content that is correlated to the Oregon State Core and Content Standards and Essential Skills grades 6-8, which promote scientific inquiry, use of evidence, critical thinking, making connections, and communication.

Discovery Education Science for Middle School provides content in multiple digital formats for teachers and students to use in mastering the 2009 Oregon State Science Standards.

Core Standard	**6**	**7**	**8**
Structure and Function	√	√	√
Interaction and Change	√	√	√
Scientific Inquiry	√	√	√
Engineering Design	√	√	√

Core 1 and 2 content strands (Structure and Function and Interaction and Change) are fully addressed. The specific content organization of Discovery Education Science divides each topic into strands that parallel the core content strands of Structure and Function and Interaction and Change. All content standards for physical, life, and earth and space science are supported by digital media resources.

Example: the topic of Matter is organized into Properties of Matter and Changes in Matter; and the topic of Cells is organized into Cell Types and Cell Processes.

Core 3 content strand (Scientific Inquiry) is fully addressed with unique attention to investigative design. Virtual Labs are designed specifically to allow students to practice designing and conducting their own virtual investigations as practice for designing and conducting their own hands-on investigations. Other interactive resources allow students to explore concepts at their own pace following unique pathways.

Example: Students solve a problem involving two ponds. In one pond, fish are dying. In the pond next to it, everything survives. pH level is suspected of being the problem. In the Virtual Lab, students are able to test different levels of water and produce different levels of acidity and alkalinity, observing how this affects the virtual organisms in their lab tank.

Core 4 content strand (Engineering Design) standards are addressed. Unique Discovery Education video, text, and interactive content provides students with examples of engineering purpose and design, and Virtual Labs allow students to test, measure, and record changes in design.

Example: Students are challenged to determine the best design for a new skillet handle that will keep it lightweight, yet protect the user from excessive heat.

In addition, all of the over 17,000 digital middle school science resources are searchable by Oregon State Content Standard. Teachers can quickly identify and access the exact resources that address a specific standard to use them for instruction or assign them to students.

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

2. Provide formative, summative, and diagnostic assessment for various levels of learners that include conceptual understanding, basic and procedural skills, scientific inquiry, and engineering design. Multiple assessment formats are included.

Discovery Education Science supports the cycle of formative assessment and instruction by providing a simple but efficient means for teachers to quickly assess students, review data, and assign resources based on the results. This enables teachers to monitor student learning and use data to plan instruction. The same assessment process can be used to develop end of topic assessments.

An Assessment Manager enables teachers to develop an online assessment from a bank of over 2,200 items appropriate to specific Oregon State Science Standards. Items may be selected by choosing a specific Oregon State Science Standard or by keyword search. The search return lists all the appropriate items and allows the teacher to add any or all to the assessment. Teachers may assign the assessment to students who access it through their individual login accounts. Teachers may view the results of the assessment by individual student or by class and examine data to the item level. In this way, teachers can monitor individual students or identify strengths and weaknesses of the whole class in order to prioritize instruction and direct instructional resources to groups or individuals.

In addition, the Assessment Manager tool offers a remediation option. Each item in the Discovery Education Science item bank is linked to specific resources that provide related content information. The report option allows teachers to select specific assessment items and view recommended remedial resources that reinforce the content for that item. Selected resources can be assigned to specific students or groups of students who missed those items. Because students can access their login from any location with an Internet connection, students can use the remedial materials in class, after school, or even at home.

Teachers can assign different remedial resources to different students, based on their learning styles as well as their content needs. Students who learn best through reading can be assigned reading passages. Students who need visual support view videos on the same content. Students who require a more hands-on approach can be assigned interactive resources. In most cases, teachers allow students to choose from the different types of assigned resources, with the goal being to master the required knowledge.

The results of immediate online formative assessment ensure that teachers have a clear picture of student conceptualization and allow teachers to monitor student progress toward concept mastery. Connecting these assessments to Oregon State Science Standards allows teachers to know where to place emphasis on instruction and where to assign individual remedial materials for students to access on their own.

Inquiry and engineering skills are typically harder to assess. However, using the process found in Discovery Education Science Virtual Labs, teachers can monitor and assess how well students are able to carry out science investigative design and engineering design testing, analysis, and design change. In addition, teachers can use a specially developed series of *MythBusters* episodes to check for understanding about engineering design.

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

3. Provide engaging, scientifically accurate student materials that address a wide range of learning styles and abilities, which may include print materials, graphics, audio support, technological options/recommendations, materials list and reference information for lab experiences some of which are inquiry based, etc.

Discovery Education Science is a digital technology science resource designed to address different learning styles of students. A major advantage of digital media is the variety of formats in which content can be delivered. Text, auditory, and visual support, as well as interactive experiences provide similar content through different media. Digital video is available for the visual learner who responds to sound, color, and action. Leveled reading passages and articles are available for students who grasp concepts best through the written word. Integrated Science Simulations and Explorations allow students to participate, make choices, and then ask and test questions. Interactive videos provide a mixture of text and audio/visual presentation. Virtual Labs focus on investigative and engineering design, giving students the chance to practice developing investigations.

All students improve their conceptual understanding by experiencing the content through multiple learning modalities. Each digital experience reinforces the concept in a different way, resulting in a stronger likelihood that students will retain and be able to apply the knowledge. Learning is reinforced when students make the knowledge their own by using the content. Thousands of images can be used by teachers and students to explain science concepts. Most of the video is also editable and useable for student presentation.

Videos are selected from trusted developers including Discovery Channel and over one hundred well-known educational media publishers. Full video programs are organized into concept-sized segments of no more than five minutes so that specific science content can be viewed without going through the entire video program.

Content in reading passages and interactive resources was developed by Discovery Education, a trusted name in science. All content was reviewed by practicing science teachers and science content experts to ensure alignment with standards, appropriateness for students, and content accuracy. The nature of digital media is such that, as science knowledge changes and new things are discovered, resources are continuously updated.

Discovery Education Science Digital Media Resource Type	Number
Full Video Programs	900+
Video Segments	8700+
Interactive Explorations	151
Integrated Science Simulations	50+
Interactive Videos	50+
Science Images	6400+
Reading Passages	1220
Virtual Labs	19
Science Sleuths Labs	24
Interactive Periodic Table of the Elements	1

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

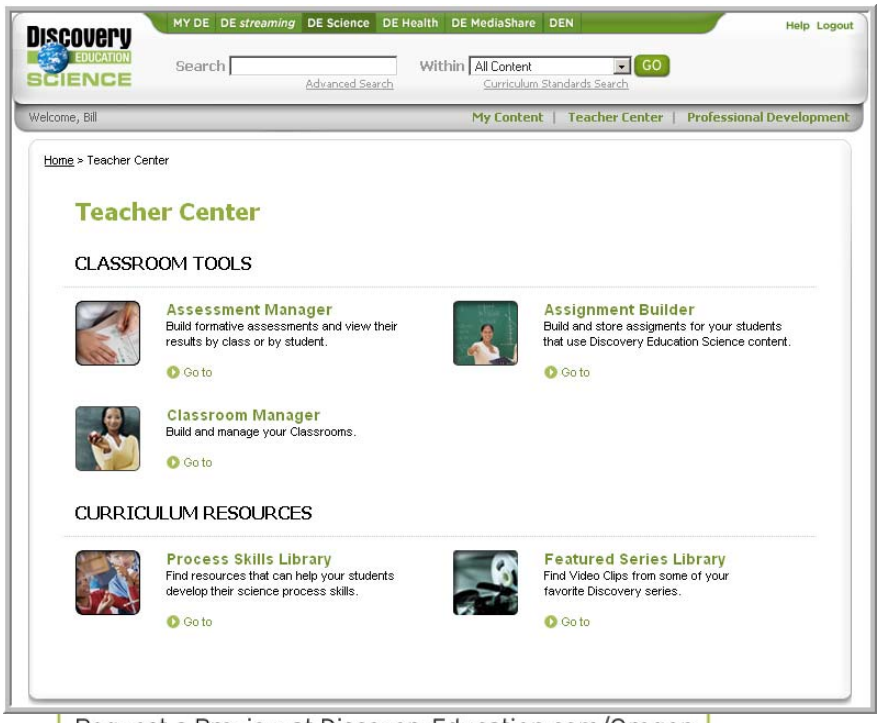
4. Allow teachers to access, edit, and print pages from a CD or online version.

A printed Teacher Guide is provided as a separate DVD, which includes individual guidance and student worksheets for all interactive resources. All teacher and student print materials are also available online in the service and linked in browse and search results.

Reading passages, delivered as full color PDF files, are leveled for readability. These may be assigned to students as online reading resources or printed out and distributed. Content delivery that combines text, auditory, and visual reinforcement engages students and increases the likelihood of student concept mastery.

The Teacher Guide also contains a guided explanation of how to use Discovery Education Science to develop student assignments. This explanation includes identifying the specific concept to be taught from state science standards, setting up a pre- and post-assessment, selecting resources, and developing the lesson sequence. The 5E science instructional model is used in structuring the lessons, and resources are identified that support each of the 5Es: Engage, Explore, Explain, Extend, Evaluate. A model lesson using Oregon State Science Standards is included as an example.

The Teacher Center allows teachers to build student assignments linked to multiple resources, build assessments, and monitor student progress. Assessments can be printed out or taken online. The advantage to online assessment is the record keeping capability of the service, reducing the need for hand-checking of assessments and allowing teachers to focus on patterns in student data. Logging onto the service, students see a Student Center, which contains the resources, assessments, and assignments that the teacher has assigned to them.

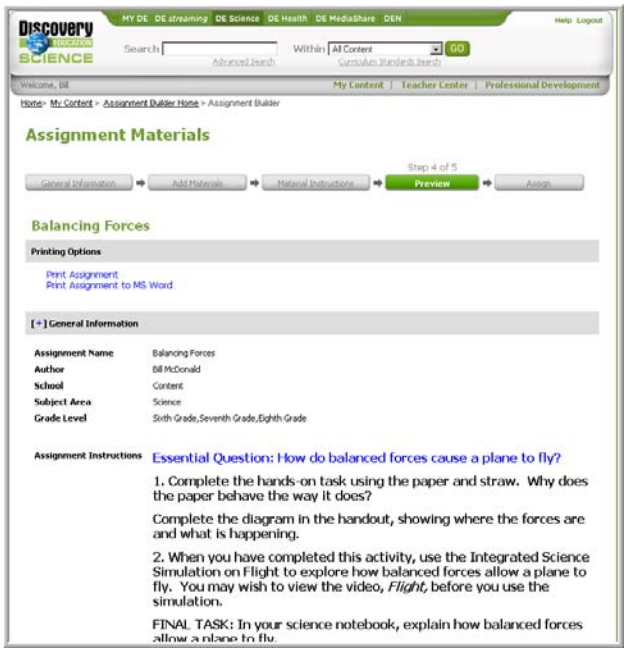


Request a Preview at DiscoveryEducation.com/Oregon

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

5. Provide teacher materials that support different student learning levels and styles, while providing guidance on implementation.

Discovery Education Science is unique in that it delivers all of its resources through technology. The powerful Internet streaming ability of Discovery Education ensures that Flash, text, and video resources can be accessed quickly and easily by students as well as teachers. A major advantage of digital media is the variety of formats in which content can be delivered. Text, auditory, and visual support, as well as interactive experiences provide similar content through different media to meet a variety of learning levels and styles.



Teachers can seek out video, reading passages, and interactive resources through keyword or Oregon State Science Standard searches. Resources can be demonstrated by the teacher at a teaching station, or assigned directly to students for use on individual or shared classroom computers. Each student receives an individual login and password. Logging onto the service, students see a Student Center which contains the resources, assessments, and assignments that the teacher has assigned to them.

A Teacher Guide is included that explains how teachers can use the digital resources for whole class instruction as well as how to target resources to individual students based on their needs. Teachers can develop online assignments as well which include directions, questions, and multiple resources. The process modeled in the teacher guide demonstrates how to incorporate different types of resources aimed at different levels and different learning styles within the same assignment. Or teachers can replicate an assignment and modify it to direct unique resources towards different groups of students or different classes.

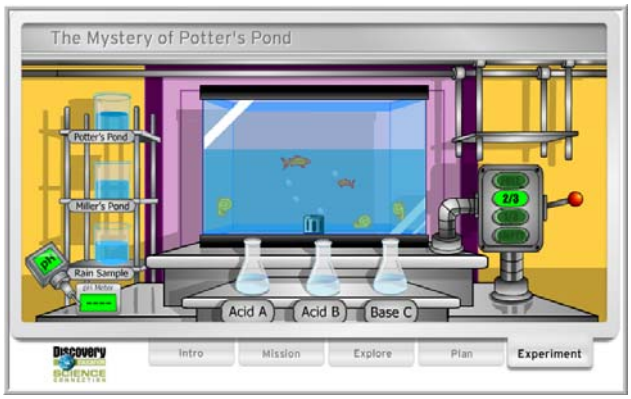
The instructional model includes identification of the specific concept to be taught from state science standards, setting up a pre- and post-assessment, selecting resources, and developing the lesson sequence. The 5E science instructional model is used in structuring the lessons and resources are identified that support each of the 5Es: Engage, Explore, Explain, Extend, Evaluate. The Teacher Center allows teachers to set up classes, quickly assign individual resources, build assignments with multiple resources, build assessments, and monitor student progress.

The Teacher Guide also explains how technology supports formative assessment and instructional planning. Teachers can quickly build brief quizzes from the large item bank, assign them to students, and get results in a data table, all in the same day. Furthermore, the internal structure of the service connects individual items to digital resources that can serve as remediation. Thus a student who misses key items on an assessment can quickly be assigned a resource that will help fill in the knowledge gap. The bank of items is extensive enough that additional quizzes with different questions can be developed to retest students.

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

6. Promote student scientific discourse to encourage evidence-based conclusions.

The powerful video content and interactive nature of Discovery Education Science promotes scientific discourse. A unique feature of Discovery Education Science is the Process Skills Library. Within this are found three resources aimed at helping students to acquire an inquiry approach to problem solving and sharpen their science investigative skills. Each of these resources takes advantage of the nature of digital media to engage students and encourage them to develop a sense of healthy skepticism.



Virtual Labs use the power of interactive media to give students practice in designing and conducting virtual investigations and in developing and testing design changes. This process is a powerful preparation for designing and conducting students' own hands-on investigations and design solutions. Each lab begins with a real world problem. Students play the role of a specific type of scientist or engineer as they work toward a solution. The labs are designed so that each team of students investigates one aspect of the problem at a time. As each group presents its findings to the class, the class discusses the findings and adds this data to the whole picture. The group reaches a conclusion which mirrors professional scientific process where teams of researchers work together on a problem.

In addition, students are challenged to critique other designs. A carefully selected and edited set of *MythBusters* programs, 15 minutes each, is provided. Students are asked to view and critique the investigation or design solution, collection of data, results, and conclusion and determine if the process was scientifically sound. Observation and discussion student sheets are provided to guide the viewing along with a teacher guide.

A series of interactive experiences called Science Sleuths engages students to use their inquiry skills to solve a mystery. Students "interview" witnesses, conduct experiments, and read information in order to solve the case, then propose their solution and receive feedback. Class discussion is encouraged as students share their findings and come to a conclusion based on data.

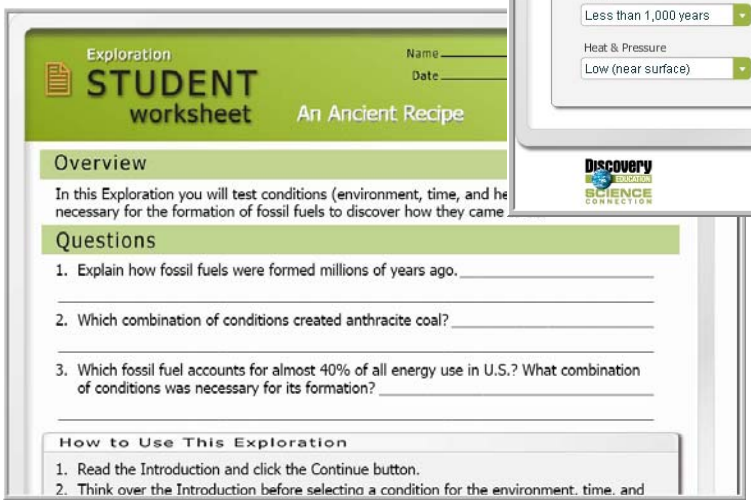
A second unique resource is the Featured Series Library. This area showcases the most recent, most powerful Discovery Education video programs selected because of content relevant to today's issues. Included are *PLANET EARTH*, *The Jeff Corwin Experience*, *When We Left Earth,* and a spectacular series on the human body called *Human Body: Pushing the Limits,* in which body systems are explained in the context of extreme physical challenges.

Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

7. Provide materials in print, audio, and online resources for students.

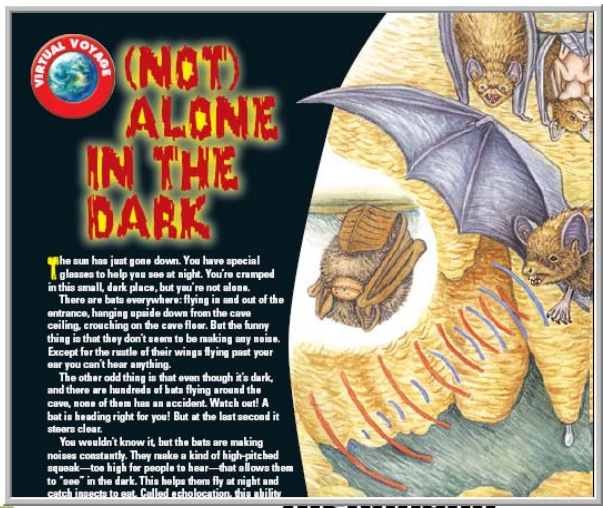
Student materials in Discovery Education Science are delivered in both digital and print formats. The service is primarily a technology science resource designed to address different learning styles of students. However, the Teacher Guide and all print materials, including worksheets and teacher directions for individual digital resources, are included in a printed notebook format as well as on DVD and online through the service. All of the nearly six hundred reading passages and nearly five hundred science articles are also provided in print and digital format. All digital versions of print materials are provided as PDF files.

As an example, students assigned to work with an Exploration log in to their individual Student Center. The resource, assigned to them by their teacher from the service using Assignment Builder, is there waiting for them. The teacher has also printed out for them the student worksheet



that goes along with the Exploration so that they can record data and respond to specific focus questions. The teacher directions include an additional discussion question to extend the learning for the class.

Content in reading passages and all digital interactive resources was developed by Discovery Education, a trusted name in science. All content was reviewed by practicing science teachers and science content experts to ensure alignment with standards, appropriateness for students, and content accuracy.



Category 2 - Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

8. Promote scientific inquiry and engineering design, reasoning, communication, making connections, cross curricular integrations, and designing and analyzing investigations.

Discovery Education Science provides a rich opportunity for students to practice science investigative design and connect this experience to hands-on investigations.

Inquiry Skills Addressed

- Developing testable questions
- Evaluating and designing a fair test
- Observing and measuring
- Gathering and interpreting data
- Repeating trials
- Developing explanations from data
- Evaluating evidence
- Communicating science
- Using mathematics in inquiry

Engineering Skills Addressed

- Observing and analyzing designed structures
- Defining a problem
- Identifying a potential solution
- Identifying factors of cost and safety
- Designing a solution
- Building the solution
- Testing the designed solution
- Collecting and analyzing data
- Adjusting the design based on result

To understand science and engineering design processes, students need practice with science investigation and exploration of design solutions. Virtual Labs use the power of interactive media to give students practice in designing and conducting virtual investigations and in developing and testing design changes. This process is a powerful preparation for designing and conducting students' own hands-on investigations and design solutions. Each lab begins with a real world problem. Students play the role of a specific type of scientist or engineer as they work toward a solution.

In Virtual Labs, students may work to determine which combination of conditions best help a tropical frog species to survive, or test the design of a racing car to meet racing specifications, or even determine what factors will produce a planet that can support life.

The advantage of a virtual investigation is that parameters are controlled, allowing students to focus their attention on the logic of the design and the results. Virtual investigations can be repeated quickly and can provide investigative experiences that are not available through hands-on due to constraints of time, resources, or safety. Teachers are guided to use the investigative design model to help students develop their own science investigations and designs. Typical of science research and good engineering design, students are directed to test one variable at a time. The class then collects all the data and analyzes all the variables together.

In addition, students are challenged to critique other designs. A carefully selected and edited set of *MythBusters* programs, 15 minutes each, is provided. Students are asked to view and critique the investigation or design solution, collection of data, results, and conclusion and determine if the process was scientifically sound.

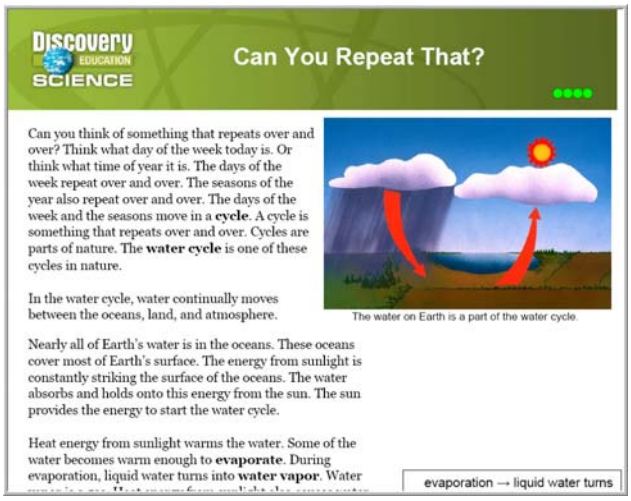
Finally, a series of interactive experiences called Science Sleuths engages students to use their inquiry skills to solve a mystery. Students "interview" witnesses, conduct experiments, and read information in order to solve the case, then propose their solution and receive feedback.

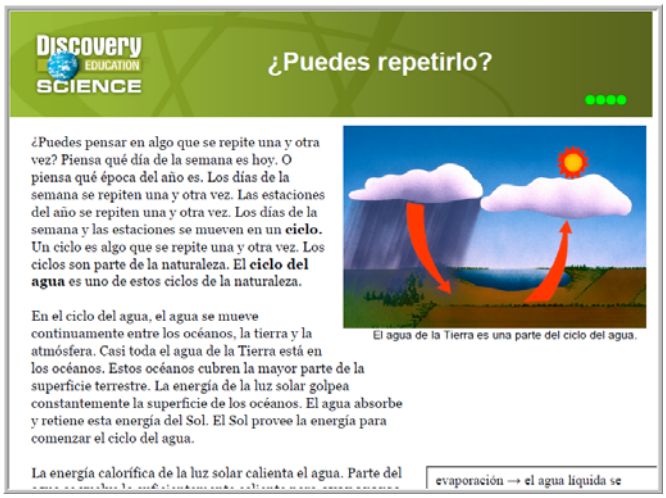
Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

9. Provide materials in multiple language formats.

Discovery Education Science provides a wide range of digital content resources organized into conceptual levels. All resources include language support.

Discovery Education Science utilizes the advantage of digital media to help teachers meet the needs of English Language Learners. Over 150 of the reading passages have been translated into Spanish in order to provide a supportive measure for students who are fluent in Spanish but who are new to learning English.





The use of animation and video to support the learning of science concepts is of high value to children learning English. Over a third of the videos on the service have been closed-captioned to support the connection between written and spoken English. Animations and interactive experiences support understanding of the associated terminology and concepts.

Perhaps the most powerful feature of Discovery Education Science in support of differentiated instruction is that teachers are able to identify, choose, and assign specific resources based on the needs of students to individuals. Students access assigned resources upon logging in to their individual student accounts. Similar science content is presented in multiple formats to engage students based on their learning styles and to reinforce concepts through multiple modalities. Teachers preview and choose the content, or they can use online assessment to determine needs and assign specific resources.

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

10. Include a variety of opportunities that promote higher level thinking.

Digital media provided in Discovery Education Science is an excellent resource to challenge high-end learners using differentiation of instruction. The science service contains higher order inquiry-based activities as well as the means for teachers to challenge students to use the resources to develop and express their own higher level ideas. By design, the service allows teachers to assign specific resources to specific students, based on their needs. Because students each log in to their own Student Center, unique content can be assigned to each individual.

Students who are ready for accelerated learning will benefit from the higher level reading, video, and interactive resources that a teacher can direct specifically to them when studying a topic in science. Using Assignment Builder, teachers can even utilize the same resources for all students, but create a more challenging and complex set of requirements for those students who are ready. All digital resources are hyperlinked from the assignment for easy access by both teacher and student.

Inquiry Problems are provided for each topic area within the service. These problems are open-ended and aimed at challenging the student to use the resources found by browsing the “Interact,” “Watch,” and “Read” tabs within the topic. Keyword searches are also encouraged. This process provides an excellent environment for students to learn real world, twenty-first century skills of defining a problem, identifying appropriate resources, utilizing those resources to gather information, and using the information to propose a solution to the problem. Teachers who wish to utilize the same inquiry problem, but who need to limit the number of resources students may choose from, can include the problem as well as the selected set of resources in an online student assignment. Both of these methods are illustrated in the Teacher Guide under Pathway 2.

Science Sleuths are a series of 28 challenging “mysteries” in which science is used to solve the case. Students “interview” the client, scientists, and other witnesses as well as use science tools and online print resources (articles, e-mails, etc.) to gather enough information to pose a solution.

Virtual Labs within the service are a stepping off point for students who are learning how to conduct science investigations for class or for a science fair project. The labs provide a place for students to practice the steps in investigative design, investigation, data collection, analysis, and conclusion in response to a posed problem. This process mirrors the method students must use to develop their own investigations and set up engineering designs in response to real problems around them.

Explorations and Interactive Science Simulations both promote higher order thinking skills by challenging students to explore concepts for themselves, rather than simply supplying the correct scientific information. Students’ trial and error efforts hone their reasoning skills and teach perseverance.

Finally, much of the digital media provided in the service can be downloaded, edited, and utilized by students in their own science presentations.

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

11. Provide for meaningful practice, remediation, and enrichment to support multiple learning styles and learning levels including all subgroups (ELL, SPED, and TAG).

Discovery Education Science provides a wide range of digital content resources organized into conceptual levels. All resources include language support. A major advantage of digital media is the variety of formats in which content can be delivered. Text, auditory, and visual support, as well as interactive experiences provide similar content through different media. Digital video is available for the visual learner who responds to sound, color, and action. Leveled reading passages and articles are available for students who grasp concepts best through the written word. Integrated Science Simulations and Explorations allow students to participate, make choices, and then ask and test questions. Interactive videos provide a mixture of text and audio/visual presentation. Virtual Labs focus on investigative and engineering design, giving students the chance to practice developing investigations.

All students improve their conceptual understanding by experiencing the content through multiple learning modalities. Each digital experience reinforces the concept in a different way, resulting in a stronger likelihood that students will retain and be able to apply the knowledge. Learning is reinforced when students make the knowledge their own by using the content. Thousands of images can be used by teachers and students to explain science concepts. Most of the video is also editable and useable for student presentation.

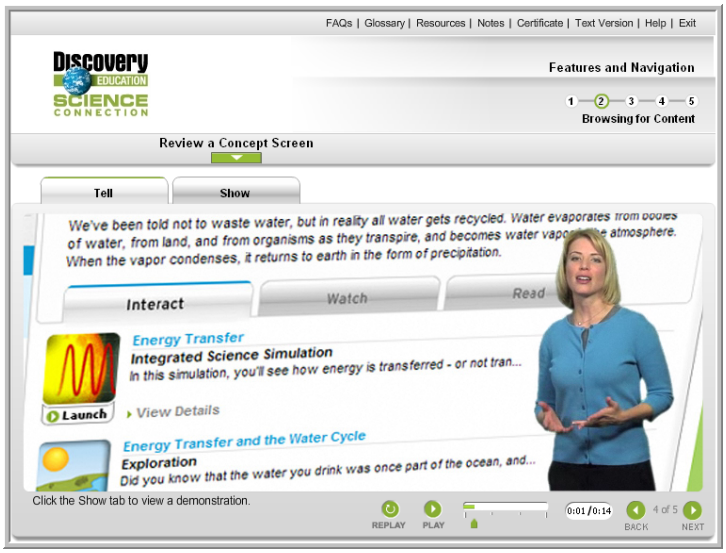
Reading passages for all topic areas in science are leveled through Lexile analysis and are available at independent reading levels for middle school readers. Over 150 additional reading passages have been added from the elementary collection to extend the Lexile range. Articles, chosen from the Weekly Reader collection, are leveled for middle school (Grade 7), below level (elementary level reading) and above level (high school level reading. Spanish and English versions of additional reading passages across the science topic areas are provided to support the transition of students to English competency.

Over two hundred high quality science videos are closed captioned to assist students in matching text to speech and learning key science vocabulary. Video segments and programs are designated with appropriate grade levels within each concept page.
In addition, a series of Interactive Videos highlights key science vocabulary with on-screen clickable objects as the video plays.

Perhaps the most powerful feature of Discovery Education Science in support of differentiated instruction is that teachers are able to identify, choose, and assign specific resources based on the needs of students to individuals. Students access assigned resources upon logging in to their individual student accounts. Similar science content is presented in multiple formats to engage students based on their learning styles and to reinforce concepts through multiple modalities. Teachers preview and choose the content or use on-line assessment to determine needs and assign specific resources.

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

12. Make available on-going professional development for implementation and continued use of the curriculum.



Professional development using Discovery Education Science is unique in several ways. First, the site itself contains an online professional development area. This includes an interactive course that familiarizes teachers with each type of resource and its instructional uses. The course requires about 40 minutes of seat time and, because teachers are registered on the site, can be taken in several sittings. As teachers move through the content, they try out different digital resources and take an online assessment to demonstrate mastery. For teachers who demonstrate mastery, the course includes a certificate of completion that can be used to assign professional development credit to teachers.

In addition, a series of best practices videos are available in the professional development area. These videos illustrate the 5E model of instruction in science with footage from three middle school science classrooms and interviews with exemplary science teachers.

Second, Discovery Education Science links teachers to an extensive professional community called the Discovery Educator Network. Over 40,000 strong, this online network among teachers is used for training, sharing, and collaboration. Led by experienced professional Discovery Education staff, this network actively involves teachers in growing as professionals who use technology to teach themselves and their students. Webinars, blogs, RSS feeds, and other technological connections are an integral part of this learning community.

Finally, Discovery Education offers direct on-site science program training that incorporates science concepts, science practice, and the use of educational technology to improve achievement by differentiating instruction and monitoring student learning. With the support of seasoned professional development staff, teachers move through the process of first familiarizing themselves with the different digital resources, then choosing resources to differentiate instruction and next to building classes and assigning resources to students. Teachers learn to build multiple resource assignments and to create and use ongoing formative assessment so that they can monitor student learning and assign remediation materials as needed. An online Trainer's Toolkit provides resources for local school trainers where the school system chooses to use a distributed network training model.

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

13. Provide analysis of readability using the Lexile Framework for reading representing a variety of materials.

Readability levels have been analyzed for all reading passages and articles using the Lexile Framework analysis tool. Reading passages were developed for Grade 7 independent reading level but run a range of Lexiles around that level. In many cases, the use of charts and tables within the passage raises the Lexile score above the level of the explanatory text. Articles selected from the *Weekly Reader* collection and were evenly distributed at multiple reading levels. Below is a chart of the Lexile scores and the number of passages and articles for each level.

Discovery Education Science Middle School Reading Passages	
Lexile Score Range	Number of Titles
1500L +	2
1400L – 1490L	16
1300L – 1390L	32
1200L – 1290L	63
1100L – 1190L	116
1000L – 1090L	163
900L – 990L	104
800L – 890L	45
700L – 790L	30
Below 700L	25
1500L +	2
Total	596

Discovery Education Science Middle School Science Articles	
Lexile Score Range	Number of Titles
1500L - 1660L	**6**
1400L - 1490L	**25**
1300L - 1390L	**60**
1200L - 1290L	**78**
1100L - 1190L	**94**
1000L - 1090L	**114**
900L - 990L	**53**
800L - 890L	**29**
700L - 790L	**10**
500L - 690L	**3**
Total	472

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

14. Provide materials written at grade level Lexile for intended audience and provide for struggling readers at several lower Lexiles.

Discovery Education Science reading materials are written on various Lexile levels for middle school readers. With a Grade 6–8 range of reading, the passage scores run between 870 and 1090L, with the great majority scoring between 800L and 1200L. The material incorporates images and other graphic contextual clues to assist readers. Written in a colorful magazine style, the reading passage collection includes a variety of types of reading including brief biographies, graphs, charts, maps, articles, and interviews.

A Giant Step for Magnetkind

Way back in 1600, Queen Elizabeth I's physician, William Gilbert, proposed that compasses work because Earth itself is a giant magnet. To prove his theory, Gilbert rubbed a needle with lodestone, giving it magnetic properties. He stuck the needle in a cork and floated it in a water-filled goblet, so it could move freely. In test after test, the magnetized needle pointed down toward Earth. Gilbert's original theory was correct: Earth has a "magnetic soul."

Following are Gilbert's notes comparing Earth to that natural magnet, lodestone:

London, England, 1600

De Magnete by William Gilbert
Book I, Chapter XVII

Toward lodestone, as we see in the case of the Earth, magnetic bodies tend from all sides, and adhere to it; it has poles... natural points of force that through the co-operation of all its parts excel in prime efficiency; such poles exist also in the same way in the globe... . Like the Earth, it has an equator, a natural line of demarcation between the two poles... . Like the Earth, the lodestone has the power of direction and of standing still at north and south; it also has circular motion to the earth's position, whereby it adjusts itself to the earth's law... . The greater part of the visible earth is also magnetic, and has magnetic movements... .Thus every separate fragment of the earth exhibits in indubitable experiments the whole impetus of magnetic matter... .

Gilbert demonstrated that Earth must be magnetic by showing how a magnetized needle would dip at an angle to Earth's surface, just as a magnetized needle dips at angles to a spherical lodestone's surface.

MAGNETIC RECORDS

Almost 400 years after Gilbert's discovery, scientists are still learning about Earth's magnetism. They try to use observations as part of their evidence, just like Gilbert did. And as the geologists F.J. Vine and D.H. Matthews learned, one discovery about Earth often leads to another.

Have you ever looked at a map of the world as if it were a puzzle that needed putting together? Africa would fit nicely in the nook between North America and South America, just as the bulge on the top corner of South America would fit quite nicely in the curve of West Africa. People have long wondered whether the continents seem to fit together so well. How could it be possible for these huge, lumbering masses of rock to ever move across the globe as easily as if they could float! It wasn't until the 1960s that scientists began to find evidence in Earth's magnetism suggesting that continents do float and drift across the globe and that at one time they fit together like a puzzle.

In 1963, Vine and Matthews were studying the sea floor. They knew that special machines called magnetic anomaly detectors (MADs), which are dragged behind boats over the Atlantic Ocean, revealed that rocks are magnetized in a banded, balanced pattern along the sea floor on either side of a mid-ocean ridge. Corresponding bands on either side of the ridge had been magnetized in different directions than the bands next to them. The scientists also knew that basalt (the rock that forms most of the sea floor and is rich in iron) is above the Curie point of temperature when it is molten. As the basalt cools and hardens, the iron in it becomes magnetized in the direction of Earth's magnetic field. The banding patterns on the ocean floor suggested that Earth has reversed its magnetic field many times through its history. But how could these patterns have formed?

Here's what F.J. Vine and D.H. Matthews figured out:

Mid-ocean ridges are actually cracks in the ocean's crust. As the continents are pushed apart by forces in Earth's mantle, pressure is released and molten rock flows up through the mid-ocean ridge cracks to fill the space left by the separation. This demonstrates that the ocean floor spreads. But not all scientists were convinced this new information also proved continents drifted. More evidence was needed.

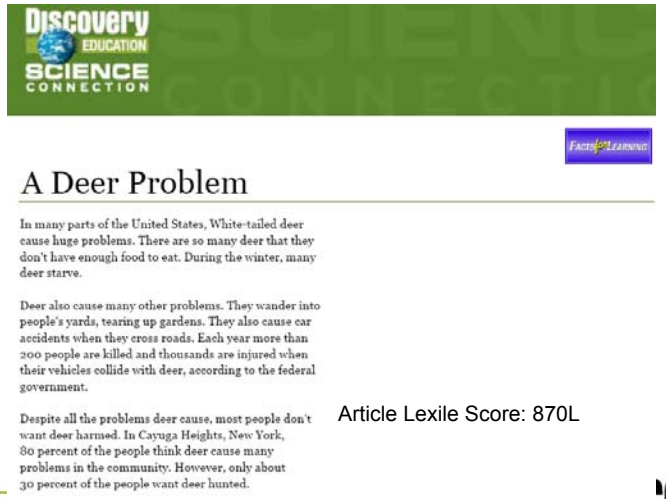
This time the magnetic records on the continents helped provide the rest of the solution. Geologists who study the magnetic properties of igneous rocks noticed that they were magnetized in all different directions, not just north and south. As lava erupted from volcanoes and cooled into solid rock, iron in the rock was magnetized in the direction of the Earth's magnetic field at the time of the eruption. This "froze" the magnetic directions of north and south into the rock. Later, as the continents drifted, the rocks were turned in different directions so that their north and south alignment no longer matched the present day alignment on Earth. The only explanation for this was that the continents had somehow shifted in their position. The theory of continental drift gained much support.

Activity

POLAR PUZZLER Cut out pieces of paper or posterboard in the shapes of the continents. Arrange your continents on a piece of paper covering a flat surface just like they're arranged on a map of the world. Outline each continent in its current position, and then start puzzling. Experiment with how certain continental plates might have once fit together, and how they might have split up and "floated" into the positions they're in now.

DISCOVERY EDUCATION SCIENCE CONNECTION

Articles from the renowned *Weekly Reader* collection are also available in the service. A mix of articles was selected to provide on, below, or above grade level reading opportunities for middle school students. The Lexile score range goes from 520L for simple definition passages to more complex science articles scoring above 1500L.



Discovery Education Science Connection

Facts for Learning

A Deer Problem

In many parts of the United States, White-tailed deer cause huge problems. There are so many deer that they don't have enough food to eat. During the winter, many deer starve.

Deer also cause many other problems. They wander into people's yards, tearing up gardens. They also cause car accidents when they cross roads. Each year more than 200 people are killed and thousands are injured when their vehicles collide with deer, according to the federal government.

Despite all the problems deer cause, most people don't want deer harmed. In Cayuga Heights, New York, 80 percent of the people think deer cause many problems in the community. However, only about 30 percent of the people want deer hunted.

Article Lexile Score: 870L

Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

15. Provide relevant applications for students to relate science to life, home, school, various careers, and to apply their knowledge and skills as scientifically literate citizens.

Discovery Education Science takes full advantage of the power of digital media to help students relate science concepts and processes to the world around them. Text, video and interactive resources reveal connections to scientists and problems in the world around us. Representations of scientists and engineers are balanced in terms of gender and ethnic background.

Discovery Education video brings science to life with engaging images and story lines from *PLANET EARTH* to *Human Body: Pushing the Limits*. Drawing from its own extensive video collection as well as dozens of other trusted educational video publishers, video brings students to places and events that allow them to see science in action. It challenges them to consider environmental, health, and science in society issues of our time. Science investigations that are beyond the scope of a classroom are presented as well as video-photography that utilizes effects such as slow motion, time-lapse photography, and multiple camera views. Interviews with practicing scientists and engineers and observations of them at work help students overcome the stereotypes they encounter in popular media.

Each topic area contains an Inquiry Problem, in which a science challenge from real life is posed. For example, a local newspaper is reporting sightings of a variety of wild felines: pumas, cougars, and mountain lions have been seen in the area. Is there some kind of strange invasion going on? As students learn about animal classification, they come to understand the reason for an agreed upon naming system for organisms among scientists.

Custom-developed science reading passages were specifically written to connect students' experiences with science content in meaningful ways. Reading passages present text and images that help students to see that science is all around them in their everyday life. Science and engineering achievements, such as the study of active volcanoes and high speed maglev trains, are shown in images and described in text to help students see how science is applied to answer questions and solve problems in the real world.

Virtual Labs are designed to place the student in the role of the scientist or engineer. Each Virtual Lab begins with a problem or question and opens the investigation with a real world scenario in which they will act as a particular type of scientist or engineer (e.g. agronomist, zoologist, or marine engineer). Students develop testable questions or design ideas, plan the investigation or design challenge, conduct the trials, collect data, and analyze it to report results. The labs are specially designed so that students work in collaborative teams and share out their results with the entire class.

As they become more aware of what constitutes good science practice, students are challenged to watch the *MythBusters* crew as they use science to debunk common myths. Students critique the investigative and engineering designs to see if proper scientific and engineering process was used to gather data and draw conclusions. Often the *MythBusters* team must engineer a design as the means to answer a question or solve a problem.

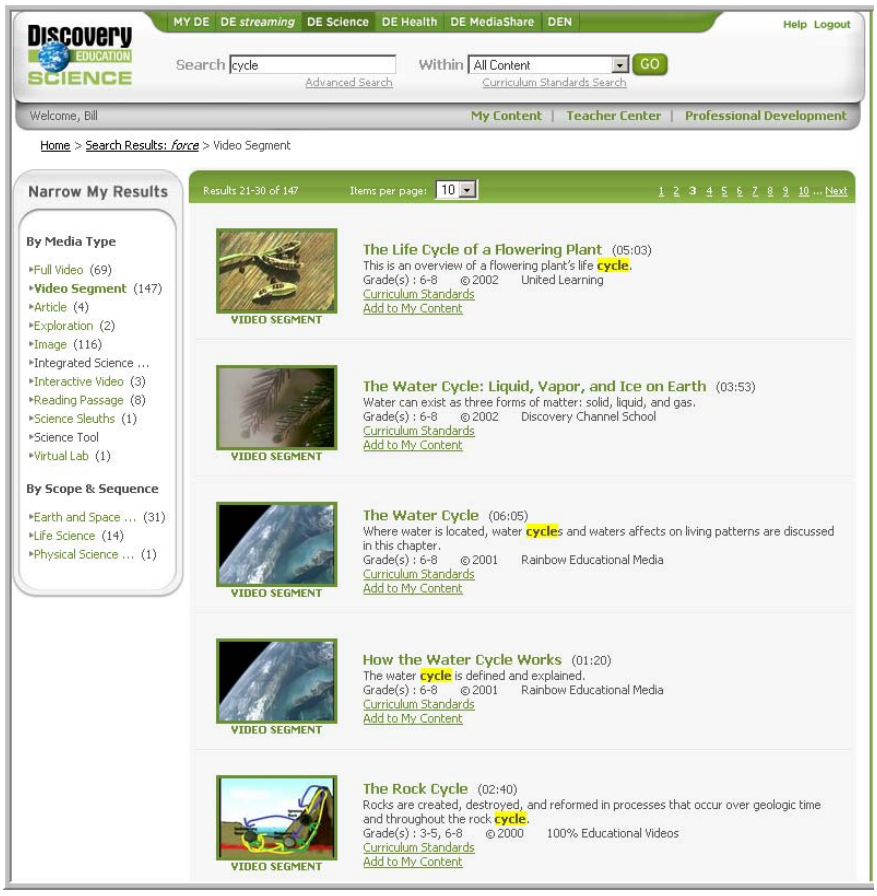
Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

16. Provide for integration between the science content strands of life, physical, and earth and space.

The structure and function of a digital media service enables the cross referencing and integration among science content strands and topics. Rather than using a single pathway through content, the organization of digital media is dynamic, allowing connections among concepts from different areas of science as well as extensions from a concept in a variety of directions.

Within each topic and concept area are digital media resources from the full range of content related to that concept. In studying waves, for example, the digital content connects many aspects of waves, reaching into the study of mechanical energy, sound, light, and simpler forms of radiation. The same and similar resources are connected to the separate topic areas of sound, light, earthquakes, solar energy, and astronomy.

The search engine keyword result also demonstrates this connectivity among science topic areas. As teachers search for the digital resources on a topic such as cycles, related media from all areas of science is returned. Teachers can use this relationship to demonstrate that cycles occur in many places, in organisms, weather and climate, under the Earth, and even in the universe outside Earth's atmosphere.



Category 2 – Science, Grades *6-8*
II. *EVALUATIVE CRITERIA SECTION*
Instructional Materials

17. Provide materials that are visually uncluttered and laid out in an easy to follow format, allowing quick identification of lesson objectives and preparations.

More than a searchable library of digital resources, Discovery Education Science is structured around science content as well as science process and engineering skills. The opening browse screen displays three science categories of earth, life, and physical science. Active navigation allows teachers and students to delve deeper into each topic, eventually reaching the individual concept level.

Also immediately available is a Science Process Skills Library which contains Virtual Labs, Science Sleuths, and specially edited *MythBusters* episodes. These resources give students practice designing and conducting science investigations and choosing engineering design options as well as critiquing the designs of the *MythBusters*.

As with all Discovery Education services, a simple, but powerful keyword search is available that includes a spelling correction feature as well as an advanced search. The advanced search features allow teachers to narrow the search by digital media type, scope and sequence, and even specific publishers. An Oregon State Science Standard search allows teachers to click on the standard and reveal an entire list of all digital resources related to that standard. Teachers can add those resources to their content folders, assign them directly to students, or add them to a multiple resource assignment.

The design and functionality of the service is consistent with the on-screen technology needs of middle school students. Through well-defined buttons, clear interactive elements, and simple navigation schemes, students explore the variety of materials. Functionality and information specific to teachers is hidden from the student user interface. In addition, the teacher controls which resources are available to students in their individual Student Centers to help maintain focus. Students are able access the entire content and process browse area through a doorway in the Student Center.

Within the browse, each concept page is organized into modalities of learning: Interact, Watch, and Read. Within Interact are found Explorations, Interactive Simulations, Interactive Video, Virtual Labs, and Science Tools appropriate to that concept. Within Watch are the many video segments that provide understanding of the concept. The full video program for each segment is accessible in the video player, and teachers and students often view more than one segment from a program. Within Read are the reading passages that support and extend the concept.

Teachers can organize multiple selected resources into online assignments complete with instructions, questions, and online assessment measures. Students also receive these in their Student Center. A model of how assignments are built and an example of a lesson plan is included in the teacher guide materials for the service.

Because Discovery Education Science is an online digital media service, all of the digital resources can be hyperlinked from district and state documents. Any scope and sequence or instructional document can be adjusted to link to video, text, or interactive resources that support a specific science concept.