

BIOZONE's response to EdReports' Review of:

BIOLOGY for NGSS

Multiple Approaches to NGSS Delivery

The **Next Generation Science Standards** (NGSS) are progressive, allowing publishers to explore multiple pathways to construct and deliver a robust instructional program. The National Academies of Sciences, Engineering, and Medicine, 2015, referring to K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (National Research Council, 2012) and **Next Generation Science Standards: For States, By States** (NGSS Lead States, 2013) says that *'There are many approaches to science instruction that could be consistent with the vision in those documents'*. BIOZONE's approach presents students with a series of engaging activities that weave together all three dimensions to ensure that they receive a well-rounded science education and are stimulated to pursue a lifelong interest in the world around them.

BIOZONE and NGSS

BIOZONE has been an innovator in High School science education for over 30 years. We pride ourselves on listening to educators and students to ensure that our resources are pedagogically sound, while keeping the needs of students front and center. This approach is clearly evident in our commitment to improving ***Biology for NGSS***. The first edition (2014) won the AAP REVERE award for best supplemental resource for science. Since then, two further editions have been released, reflecting changes in pedagogy, incorporating new and innovative features, and ensuring that content and data is current. BIOZONE is very proud of ***Biology for NGSS*** and it is well received by school districts across the USA, as evident by our strong and growing customer base. We encourage you to watch our [Biology for NGSS video](#) to find out more about the design, features, and pedagogy of the title for yourself.

Our [evaluation and evidence document](#) provides ample, specific evidence and examples demonstrating how ***Biology for NGSS*** meets the requirements of the NGSS framework. This includes demonstrating evidence for the integration of the three dimensions, assessments, including testing student knowledge of the Performance Expectations, and phenomena-based approach.

A Three-Dimensional Approach

BIOZONE chose to structure ***Biology for NGSS*** around the **Disciplinary Core Ideas**, allowing teachers a logical, yet flexible, way to present content. When writing ***Biology for NGSS***, BIOZONE's authors ensured that the three dimensions formed the foundation of the title and that they were carefully and purposefully incorporated into the teaching material. Evidence for this is clearly visible through color coding in both the student and teacher editions and illustrated in this [alignment document](#). Content is carefully scaffolded using the 5Es instructional approach. This ensures that student interaction and understanding of the required three dimensions is developed over a meaningful learning sequence. Information is presented to students through clear, engaging graphics and short blocks of text that do not overwhelm the reader. By completing the activities, students will have engaged with and covered the specific three dimensions required to demonstrate understanding of the relevant Performance Expectation(s).

Phenomena

The NGSS framework strongly promotes the use of phenomena both to engage students and promote inquiry. In designing *Biology for NGSS*, the authors put considerable effort into including phenomena throughout. Anchoring phenomena begin and end every chapter. The authors specifically chose examples that appeal to a broad range of students, with which they may have some familiarity, but cannot yet fully explain. Investigative phenomena, i.e. investigations and practical activities, are included throughout and, where possible, students are asked to relate their own lived-experience to the content. This gives teachers an opportunity to understand what students already know about ideas that will subsequently be presented. When phenomena are revisited at the end of a chapter, students apply the knowledge gained through interacting with the material to fully explain it. Through observations, discussion with peers, and analysis, students are describing and explaining the phenomena they investigated.

Assessment

Recommendation 4 of **Guide to Implementing the Next Generation Science Standards** (National Academies of Sciences, Engineering, and Medicine, 2015) states that teachers should incorporate performance tasks, open-ended questions, writing tasks, student journals, student discourse, and other formative assessment strategies in their instruction. BIOZONE's *Biology for NGSS* offers teachers numerous ways to stimulate students' interest and assess their understanding of what has been taught.

In describing performance expectations, the NGSS website states that, "*The NGSS is not a set of daily standards, but a set of expectations for what students should be able to do by the end of instruction (years or grade-bands). The performance expectations set the learning goals for students, but do not describe how students get there.*" (Next Generation Science Standards, 2023). BIOZONE has consistently addressed the three-dimensional **Performance Expectations** (PEs) required to assess student understanding. Activities containing assessments of specific PEs are identified and tagged within the Teacher's Edition. PE assessments occur over a range of activities or over a set of questions within the Summing Up activity. These allow teachers to assess student understanding of the PE. The three dimensional construction of the assessment tasks ensures the DCIs, SEPs, and CCCs are built into the task, as appropriate. By default, students are demonstrating skills and knowledge across the three dimensions by completing these tasks. Having multiple opportunities for students to demonstrate understanding allows them to learn as they go and increases learner success at demonstrating understanding.

EdReports' Critique of BIOZONE's *Biology for NGSS*

While we value EdReports' attempt to review the array of instructional materials presented to busy educational providers to help them make an informed choice, we believe their interpretation of the mode of delivery of NGSS is just one of many. BIOZONE's approach presents students with a series of engaging activities that weave together all three dimensions to ensure that they receive a holistic, scientific education. Unfortunately, EdReports' approach clearly does not align with that of BIOZONE's and is a different interpretation of how NGSS might be delivered. We strongly disagree with the view of EdReports that *each activity* needs to *incorporate all three dimensions*. We would counter that this is simply not possible to do in a meaningful way, nor is it always relevant for the wide variety of activity types provided in our title.

The EdReport review states that the DCI content of BIOZONE's *Biology for NGSS* is at grade level but suggests the SEP and CCC dimensions are sometimes below grade level. We believe we have constructed material at the

appropriate grade level across all three dimensions. BIOZONE's scaffolded approach to delivery using the 5Es allows for a progressive development in depth of content over a learning sequence. This is critical, given the current, poor state of student academic preparedness due to the decline experienced during the pandemic. At the request of educators, we have sometimes used the early stages of the Es to reintroduce material core to progressing through the High School content. As educators ourselves, and from customer input, we know that students do not readily retain information from year to year. By including material that provides familiar background and context, teachers can reintroduce concepts concisely and then efficiently move on to High School content. We stand by this approach of delivery, as it is validated by educator feedback.

Like the delivery of the three dimensions, BIOZONE's approach to the PEs differs from that of EdReports.

We have unaddressed concerns that EdReports has identified the **Summing Up** activities at the conclusion of each chapter as the only place the PEs are met. While this is where the bulk of the assessments lie, many PEs are also built into content activities, especially when the PE requires students to carry out an investigation or use and refine a model. For example, in Chapter 7 (**Energy Flow and Nutrient Cycles**) the PEs are not only covered in the 'Summing Up' activity but also in activities 138, 145-147, 150-151, and 153. Collectively, the assessment tasks for a chapter have been designed to cover all the components required for assessing the PE. Therefore, we believe that the EdReports' comment in their report that, 'the **Summing Up** tasks are a missed opportunity to measure student achievement across numerous elements of the chapters learning objectives,' is patently incorrect.

It is very disappointing that EdReports considers only seven of our 13 chapters to contain Anchoring Phenomena and was unable to provide an explanation as to why the others were rejected. We strongly disagree with EdReports on this point and consider each of our examples to be phenomena.

We are also perplexed as to why our strong suite of practical investigations is not regarded as phenomena.

In general, we suggest that the EdReports' criteria adopted for the review process are both linear and rigid, and do not take into consideration the innovation that NGSS encourages. In fact, during the error and omissions process, EdReports stated on multiple occasions that, "*It appears that there is a difference in philosophy,*" regarding how BIOZONE has chosen to interpret and assign indicators, features, and content compared to how EdReports interprets them. This acknowledgement is a clear indication that the framework can be interpreted in multiple ways. We strongly advocate that there is no one way to deliver NGSS and respectfully disagree with EdReports' assessment. We stand by the approach we took as we researched, designed, and wrote ***Biology for NGSS***.

References

National Academies of Sciences, Engineering, and Medicine. 2015. Guide to Implementing the Next Generation Science Standards. Washington, DC: The National Academies Press. <https://doi.org/10.17226/18802>.

Next Generation Science Standards. 2023. Performance Expectation (PE). <https://www.nextgenscience.org/glossary/performance-expectation-pe>

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