

Concord Evaluation Group

Evaluation of Jonathan Bird's Blue World: Ocean Science Resources

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Table of Contents

Background.....	1
Methods and Procedures	3
Study Design.....	3
Study Instruments	3
Participants.....	5
Findings	11
Classroom Evaluation Findings	11
National Teacher Interview Findings.....	18
Website Visitor Survey Findings	21
Summary	26
Findings	26
Recommendations	28
Appendix A: Student Survey	A-1
Appendix B: Student Group Discussion Protocol.....	B-1
Appendix C: Teacher In-person Interview Protocol	C-1
Appendix D: Teacher Telephone Interview Protocol.....	D-1
Appendix E: Website Visitor Survey	E-1

Background



Jonathan photographing Lemon Sharks in the Bahamas. Photo by Mark Tarczynski.

Jonathan Bird's Blue World (Blue World) is an educational, family-oriented underwater adventure series hosted by the dynamic naturalist and underwater photographer Jonathan Bird. It is co-produced by Jonathan Bird Productions and the non-profit organization Oceanic Research Group (ORG). Each half-hour television episode consists of three separate segments running 5 – 11 minutes in length. For online viewing, each segment is a self-contained

webisode. Segments encompass a variety of subjects, including stories about animals, marine research and researchers, underwater exploration and recent discoveries. The episodes are suitable for younger viewers, but target all audiences across the entire life span.¹

Jonathan Bird's *Blue World* has received many awards and honors, including eight Emmy Awards, the CINE Golden Eagle, National Educational Association endorsement, National Science Teachers Association endorsement, Honorable Mention for Cinematography at the International Wildlife Film Festival, Honorable Mention at the Blue Ocean Film Festival, Featured Selection at the Chicago International Children's Film Festival, and inclusion in the "Top 10 Web Shows to Watch During the Writers' Strike" by PCMag.com.²

In 2011, ORG received a National Science Foundation (NSF) grant to develop resources for science, technology, engineering, and mathematics (STEM) learning by redesigning and expanding the "*Jonathan Bird's Blue World*" website; adding components to enable teachers and students to search episodes for specific themes, locations, or scientific concepts; and enhancing the lesson plans to explicitly match the content standards for teaching science.

One of the major grant objectives was to make the "*Jonathan Bird's Blue World*" website content widely accessible as an open source via an Internet connection with a dynamic search capability and add this content to the National Science Digital Library. The grant enabled ORG to add a significant amount of

¹ Jonathan Bird Productions and Ocean Research Group. (2012). *Jonathan Bird's Blue World: Behind the Scenes*. <http://www.blueworldtv.com/behind-the-scenes>

² Ibid.

educational material to its list of resources and used ocean topics to illustrate nationally-accepted standards for science learning. The website was designed to be applicable to both formal and informal environments, and contained a multi-faceted approach to achieve its goal, including the following objectives: (a) build a website search capability that includes National Science Educational Standards (NSES) and Ocean Literacy Principles with a link to segments illustrating specific NSES; (b) create webisodes that feature specific NSES and develop an interactive map on the website; (c) create a user survey tool and outreach for these improvements.³

In 2012, ORG hired Concord Evaluation Group (CEG) to conduct an evaluation of the newly-designed website and STEM resources and their effectiveness for educators and students.

³ National Science Foundation (2011). *Award Abstract*.
<http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1043823>

Methods and Procedures

Study Design

The evaluation employed a mixed-method design and three distinct evaluation components:

1. **Classroom Evaluation:** CEG collected evaluation data from a middle school science classroom at a public charter school that serves mostly Hispanic/Latino children in Lawrence, Massachusetts.⁴ The classroom implemented one lesson plan, watched 3 – 4 videos, and briefly reviewed the *Blue World* website in spring of 2012. CEG observed two classroom periods when the *Blue World* resources (one video and one lesson) were in use. In a subsequent visit, CEG administered a post-test survey to students, interviewed students in two separate group discussions, and interviewed the science teacher.
2. **National Teacher Interviews:** CEG recruited eight science teachers in grades K-12 from across the country to review the *Blue World* resources during the summer of 2012. CEG conducted interviews with the teachers after they reviewed the sources.
3. **Website Visitor Survey:** ORG posted a survey on its website to collect feedback from their website visitors.

Study Instruments

We developed five instruments for the evaluation:

1. Student Survey,
2. Student Group Discussion Protocol,
3. Teacher In-person Interview Protocol (Classroom Evaluation only),
4. Teacher Telephone Interview Protocol (National Teacher Interviews only),
and
5. Website Visitor Survey.

In addition, the Lawrence science teacher collected parental permission for each student that participated in the evaluation prior to collecting any data from them. Parental permission forms were provided in Spanish and English.

⁴ Lawrence is the poorest city and has the poorest performing school district in the state. The community has a high proportion of underserved minority students—74% of the population is Hispanic.

The study instruments were designed to assess the following constructs, summarized in Table 1. The actual instruments are included in the appendix.

**Table 1:
Constructs Measured**

Constructs	Students	Lawrence Teacher Interview	National Teacher Interviews	Website Visitor Survey
Learning gained from <i>Blue World</i> resources	✓	✓		✓
Student interest or potential interest in <i>Blue World</i> resources	✓	✓	✓	
Impact of <i>Blue World</i> on student interest in ocean science	✓	✓		
Student attitudes towards oceans and ocean science	✓			
Student attitudes towards protection of oceans	✓			
Student interest in ocean science-related jobs	✓			
Appropriateness of <i>Blue World</i> resources for specific audiences	✓	✓	✓	✓
Student interest or potential interest in doing <i>Blue World</i> activities at school	✓	✓	✓	
Teacher interest or potential interest in using <i>Blue World</i> activities at school		✓	✓	
Student interest in watching/using <i>Blue World</i> resources at home	✓			
How <i>Blue World</i> resources may be integrated into science classrooms		✓	✓	
How <i>Blue World</i> resources impact teacher interest in using hands-on activities		✓	✓	
Teacher likelihood of recommending <i>Blue World</i> to other teachers		✓	✓	
Suggestions for improving the <i>Blue World</i> resources	✓	✓	✓	✓
Specific areas of interest on website		✓	✓	✓
Preferred ways to receive ocean science content		✓	✓	✓

Participants

The middle school that participated in the evaluation served a diverse population of students. In 2009 – 2010:

- Approximately 30% of students were English language learners;
- 88.5% of the students were Hispanic; and
- 73.3% of students were from low-income homes, determined by qualification for free or reduced lunch.

Twenty students from the middle school participated in the evaluation. As summarized in Table 2, the sample of students was evenly split between boys and girls. Most of the students reported they were 14 years old (65%) and Hispanic or Latino/a (80%).

**Table 2:
Student Demographic Characteristics**

	TOTAL (N = 20)
Gender	
Boy	10 (50%)
Girl	10 (50%)
Student Age	
13	7 (35%)
14	13 (65%)
Race/Ethnicity	
Hispanic, Latino, or Spanish	16 (80%)
White or Caucasian	3 (15%)
Black or African-American	1 (5%)

Students reported the kinds of jobs they imagined having someday. These included:

- Accountant
- Architect
- Business manager
- Computer gaming creator
- Computer scientist
- Culinary arts professional
- Day care professional
- Defense attorney
- Dental hygienist
- Doctor
- FBI scientist (studying bones)
- Marine biologist
- Obstetrician
- Orthodontist
- Pediatric nurse
- Philosopher
- Psychologist
- Professional who works with cars

The nine teachers in our study, including the teacher in the middle school classroom component of the evaluation, taught in seven different states (Table 3).

**Table 3:
Teacher Background Characteristics**

	TOTAL (N = 9)
State	
California	2
Maryland	1
Massachusetts	2
Michigan	1
New Jersey	1
Pennsylvania	1
Texas	1

Most teachers taught students in grades 5 – 8, however, we also included three teachers who taught younger elementary students and one high school teacher (Table 4). Teachers had wide range of experience in terms of years teaching and science subjects taught. None of the educators was familiar with *Blue World* prior to the study.

**Table 4:
Teacher Background Characteristics**

	TOTAL (N = 9)
Grade Levels Taught	
1 – 4	3
5	4
6	2
7	2
8	3
9 – 12	1
Years of Teaching Experience	
Fewer than 8 years	2
8 – 10 years	2
15 – 16 years	2
20+ years	2
50+ years	1

Science Content Taught	
Earth science	6
General science	4
Ocean science	4
Physical science	4
Biology	3
Chemistry	2
Environmental science	2
Life science	1
Communications engineering and design	1

Note: For 'Grade Levels Taught' and 'Science Content Taught', the number of teachers across grade levels adds up to more than nine teachers because some teachers are responsible for multiple grade levels and teach multiple subjects.

Forty-eight website visitors responded to the Website Survey. As summarized in Table 5, the sample was approximately evenly split between males and females. Most respondents were either 40 – 59 years old (46%) or younger than 15 years of age (36%). The majority of respondents were white (79%). Most adult respondents reported having a college degree or higher. Approximately one-third of the sample reported they were teachers (35%) across a variety of grade levels and settings.

**Table 5:
Website Visitor Background Characteristics**

	TOTAL (N = 48)
Gender	
Male	25 (52%)
Female	23 (48%)
Age Range	
6 – 10 years old	9 (19%)
11 – 15 years old	8 (17%)
16 – 18 years old	1 (2%)
18 – 29 years old	2 (4%)
30 – 39 years old	2 (4%)
40 – 49 years old	9 (19%)
50 – 59 years old	13 (27%)
60 – 69 years old	4 (8%)
Race/Ethnicity	
White or Caucasian	38 (79%)

	TOTAL (N = 48)
Asian	4 (8%)
Hispanic, Latino, or Spanish	2 (4%)
Black or African-American	1 (2%)
Education Level	
Currently in elementary, middle or high school	12 (25%)
Some high school, no diploma	1 (2%)
High school graduate (or GED)	3 (6%)
Some college	4 (8%)
Associate's degree or certificate program	3 (6%)
Bachelor's degree	10 (21%)
Master's degree	11 (23%)
Professional degree	3 (6%)
Teacher	
No	31 (65%)
Yes, grades K-2	1 (2%)
Yes, grades 3 – 5	3 (6%)
Yes, grades 6 – 8	2 (4%)
Yes, grades 9 – 12	3 (6%)
Yes, college level	2 (4%)
Yes, informal educator	4 (8%)
Yes, homeschool educator	2 (4%)

Most respondents reported that they learned about the *Blue World* website from television, through a friend, or via an Internet search engine (Table 6). Nearly half of respondents (48%) reported that they visited the website frequently (several times per month), while slightly less than one-third of respondents were first-time website visitors (29%).

Table 6:
Website Visitor Experience with *Blue World* Website

Source	Number (%) (N = 48)
Where Respondent Learned about the Website	
TV	12 (25%)
Someone told me about it	12 (25%)
Web search	10 (21%)
My teacher	5 (10%)

Source	Number (%) (N = 48)
Where Respondent Learned about the Website	
Referred from another website	2 (4%)
Other: Boston Scuba Show	1 (2%)
Other: Email	1 (2%)
Other: Facebook	1 (2%)
Other: National Science Teachers' Association	1 (2%)
Other: Personal connection	1 (2%)
Other: Roku	1 (2%)
How Often Respondents Visit the Website	
Several times per month	23 (48%)
This is my first time	14 (29%)
A couple times per month	8 (17%)
A couple times per year	2 (4%)
Almost never	1 (2%)

Findings

Classroom Evaluation Findings

CEG observed two seventh grade science classrooms in May 2012. Each classroom had ten students, for a total of 20 students. On the day that we observed the classrooms, the teacher used the *Lifespan of Overfishing* lesson plan, based on *Webisode #14, Killer Clams*.⁵ Both classes lasted 75 minutes each.

Prior to our visit, the classrooms also watched several *Blue World* webisodes and explored the website (<http://www.blueworldtv.com/>). The classes viewed the following webisodes:

- Coral Reefs (<http://www.blueworldtv.com/webisodes/watch/coral-reefs>)
- Cleaning Stations (<http://www.blueworldtv.com/webisodes/watch/cleaning-stations>)
- Tigers of the Sea (<http://www.blueworldtv.com/webisodes/watch/tigers-of-the-sea>)
- The Real Nemo (<http://www.blueworldtv.com/webisodes/watch/the-real-nemo>)

During our observations, the classroom was set up in two rows of desks, with a SMART Board at the front of the room. The teacher used it to show the webisodes, project documents, project that he was writing, and to project a chart to keep track of data throughout the exercise.

The teacher started each class at the front of the room, leading a discussion of food webs and primary, secondary, and tertiary consumers. He started by having the students name different fish to fit the food web. Next, the teacher provided the instructions for the Activity. Due to lack of availability, the teacher made the following modifications to the materials required:

⁵ The lesson plan is available online at http://www.blueworldtv.com/images/uploads/lesson-plans/Lesson_Plan_Webisode14Clams.pdf; the website is available at <http://www.blueworldtv.com/webisodes/watch/killer-clams>

**Table 7:
Modifications Made to Recommended Materials**

Recommended Materials	Replaced With
Goldfish	Small paper clips
Cheerios Fish	Big paper clips
Raisin Fish	Beans
Grape Fish	Coins (plastic)
Straw	Pencil
Journal	Napkin

Each classroom was organized into three teams (green, red, blue) that worked on the Activity separately.

Predicting that the students would over-fish during the first round, the teacher had the students modify the worksheet, dividing the cells in half so they could record two rounds' worth of data at the start.

As expected, all three teams in each classroom over-fished during the first round due to a lack of cooperation among team members. With the teacher's help, the students reflected on what they did wrong, and then the teacher let them repeat the first round. After four rounds of fishing, the class discussed the reasons for differences in the numbers of fish and "dollars" earned by each team.

The discussion revolved around the number of fish, the number of kids on teams (ratios and rates), and the number of fish per person. The teacher also re-introduced the topic of slope (which the students had already covered in math). The teacher ended the class discussion with the topic of why science and math are important to being a fisherman. He created a graph of dollars earned, but not a graph of the fish population. We observed that the students were able to connect the videos and the activities to scientific concepts of reproduction and extinction as well as the math concepts covered. After discussing the data gathered during the Activity and lessons learned from it, the class watched the webisode "Killer Clams."

We asked students to report how much they learned from the *Blue World* website, videos, and in-class lesson. Most students reported that they learned "a lot" from the videos (55%) and the in-class lesson (60%) and "a little" from the website (90%) (Table 8).

**Table 8:
Student-reported Learning Outcomes**

	Nothing	A little	A lot
The <i>Blue World</i> website taught me...	1 (5%)	18 (90%)	1 (5%)
The <i>Blue World</i> video(s) taught me...	0 (0%)	9 (45%)	11 (55%)
The in-class <i>Blue World</i> lesson (when you caught “fish”) taught me...	5 (25%)	3 (15%)	12 (60%)

Students reported they learned the following about oceans:

- *We learned that “killer” animals are not necessarily killers.*
- *I learned about coral, and algae in the coral.*
- *We didn't know that coral was actually alive.*
- *I learned that coral reefs were actually living things.*
- *I learned that even plants underwater do photosynthesis.*
- *I learned that fish excrement could turn into sand for beaches.*
- *One change in the food web can change everything.*
- *It helped me understand symbiosis. We learned about the “cleaning stations,” about the big fish being cleaned by little fish, and shrimp eating bacteria off other organisms.*
- *We learned why divers have suits on underwater – skin looks like fish underwater and they don't want to get bit or attacked.*

When we asked students to report their level of interest in the *Blue World* resources, **most students reported that they were interested in the website (85%), videos (90%), and the in-class lesson (80%)** (Table 9).

Table 9:
Student-reported Interest in *Blue World* Materials

	Not interested at all	A little interested	Very interested
The <i>Blue World</i> website	3 (15%)	14 (70%)	3 (15%)
The <i>Blue World</i> video(s)	2 (10%)	9 (45%)	9 (45%)
The in-class <i>Blue World</i> lesson (when you caught “fish”)	4 (20%)	5 (25%)	11 (55%)

Students reported that the study guide was useful because it helped them think about what they already knew. The students also reported that while they found the study guide useful, they would not want to use study guides every day. About the study guide and in-class Activity, students reported:

- *I think the (study guides) helped us get closer to the main idea of the video. They helped us discuss the points as a group. It helped me go over what I knew, and what I found confusing, and what to look for in the video.*
- *I think the questions (in the study guide) are good because, if a person was watching the video and they didn't know anything about it, the questions would help them know the main idea to take away from the video.*
- *In the beginning (of the Activity) everyone was stuck because we didn't have enough fish to reproduce. I learned that you can't fish all at one time in one place and you have to do it at different times and different places.*
- *I liked that (the Activity) was hands-on and not looking at the screen the whole time. I like that it made us think about how we were going to strategize and work as a team.*
- *I enjoyed (the Activity). I liked how it involved our math and science skills with it.*
- *Instead of us just listening to a teacher, we actually got to do an activity and watch a video. It helped us visualize the ocean with a video of it, instead of just imagining it.*

- *I thought it was funny because at first you don't know how to make that much money from fish, but after you get it, I found it cool.*

We asked students to report the extent to which the *Blue World* resources changed their interest in studying and learning about oceans. **Sixty-five percent of students reported that *Blue World* made them more interested in studying and learning about oceans.** An additional 20% reported that they were already interested in oceans before using *Blue World* resources. Only 15% of students reported that *Blue World* resources did not help them become interested in learning about oceans.

We also asked students to report whether *Blue World* changed their interest in protecting the oceans. **Thirty-five percent of students reported that the resources made them more interested in protecting the oceans,** while an additional 45% reported that they were already interested in protecting the oceans before they used *Blue World* resources. Twenty percent reported that they were not more interested in protecting the oceans after using *Blue World* resources.

We asked students to report on the impact of the various *Blue World* resources on their ocean-related interests and attitudes. As summarized in Table 10, most students (60%) reported that *Blue World* made them interested in learning more about ocean science and that *Blue World* was “right” for most kids at their grade level. Students were evenly split over whether they would want to do more *Blue World* activities in their classrooms. Only a minority of students reported that they were interested in a career where they could explore the ocean (20%), planned to visit the *Blue World* website (15%), watch *Blue World* episodes (25%), or tell their friends about *Blue World* (10%).

**Table 10:
Student-reported Impact of *Blue World* Materials**

	Strongly disagree	Disagree	Agree	Strongly agree
<i>Blue World</i> made me interested in learning more about ocean science.	—	8 (40%)	12 (60%)	—
I would like a job like Jonathan Bird’s – one where I can explore the oceans.	4 (20%)	12 (60%)	4 (20%)	—
<i>Blue World</i> was right for most kids at my grade level.	3 (15%)	3 (15%)	12 (60%)	2 (10%)
I would like to do more lessons like the <i>Blue World</i> lessons in school.	2 (10%)	7 (35%)	8 (40%)	3 (15%)
I will visit the <i>Blue World</i> website from home.	5 (25%)	12 (60%)	3 (15%)	—

	Strongly disagree	Disagree	Agree	Strongly agree
I will watch <i>Blue World</i> on television, on the web, or from iTunes.	4 (20%)	11 (55%)	5 (25%)	—
I will tell my friends to watch <i>Blue World</i> .	5 (25%)	14 (70%)	1 (10%)	—

Most students reported that they found the videos to be fun and entertaining:

- *The videos were really entertaining, and also educational.*
- *I thought it was humorous.*

Regarding the appropriateness of the *Blue World* resources for students in middle school, students' opinions were mixed. For example, students said:

- *I think it's good for 8th graders, but I think it's good for 7th graders too.*
- *I feel it was perfect for the age level.*
- *I think it was kind of childish.*
- *I get that it's something little kids are probably watching, but it seemed like it was too much of that sometimes.*

During the activity, we observed that it was challenging for some students to keep track of the items and their worth. There was some confusion over tallying scores, including which boxes to use. Some students recommended enhancing the Activity sheet they used to make it less confusing:

- *(During the Activity) I found it kind of confusing to keep track of the object, and dollar amount, and what it was connected to. I had to look back at the board to see which part went with which. I had to look back and forth a lot.*
- *I got a little confused when we had to start tallying scores, I didn't know where to put that information in the section. I got a little frustrated, but (my friend) helped me.*

After we collected data from the students, we interviewed the science teacher. He reviewed three of the lesson plans, including the lessons on Shark Biology (Buoyancy), Light, and Symbiosis. He found the Buoyancy lesson to be more appropriate for high school students; the Light lesson for 3rd – 5th grade students; and the Symbiosis lesson for his middle school students.

He noted that the lesson plans were mostly standalone components, and he thought it would require teacher's effort to integrate them into a curriculum:

I think the lesson plans are segmented. It would take a teacher making significant and necessary adaptations to weave them into a curriculum... Obviously, Blue World is not a full-option science system.

That said, he was able to identify *Blue World* resources that he could use as standalone pieces to supplement his existing curriculum. For instance, about the websiodes, he reported:

I'm seeing the video as a secondary methodology or modality to interact with the material, and an engaging aspect of the lesson; but not necessarily a vehicle for new knowledge. I'd probably use the videos for examples or introductions for my lesson plan. [...] The videos, they do seem to focus on the themes that are at a level of understanding most of the students will get.

About the website, he reported:

It's helpful to have all the information there, on the website; it's helpful to have it all in one place. Off the top of my head, I couldn't necessarily make tons of suggestions about what I would add to the website. It seems to give a solid base of what's in the material. I think it's really good-looking too, well-designed. It's really easy to use – functional and successfully compiled.

As a self-described “veteran teacher,” the science teacher also commented that he found the study guides to be “teacher-centric” and not as inquiry-based as he would prefer. However, he saw value in the study guides for new teachers, especially those who are struggling to find new content online.

I'd get rid of most of the questions. I'd probably never use a study guide unless it was one of the best ones. I'd say they need to either take the existing stuff and polish and cohere it; or get a team together and develop a theme that runs through the material.

If I was running a workshop, and I knew my audience – for an audience of new teachers who were really struggling to find new content online – I would package this up with some other websites like PBS and say, “these are some good online resources to get you started; think about it and make it work for you” [...] I think if you already have a teacher doing it wrong, this will set them on the right path.

National Teacher Interview Findings

All the teachers (100%) reported that they were likely to use the *Blue World* resources next year and to recommend the resources to other teachers. They all found the webisodes to be “highly appealing,” “very well-done,” and “extremely interesting to watch.”

Teachers reported that the lesson plans and webisodes would be easy to integrate into their classrooms.

- *I was surprised I hadn't heard of him, because it's almost the “Jacques Cousteau” level of science. So my first impression was very high. I then went through the different topics and their materials, and again was blown away. I thought this material would be a great resource. It fits perfectly into doing the two field trips later on in the year. I had a lesson about how sun screen affects coral, for example, and in this material you could see coral in the wild. (6th grade teacher)*
- *I think that's what hooked me on this – the Blue World material already has questions to ask, the study guide material, and the video clips are great. (6th grade teacher)*
- *(What's most appropriate for my classroom are) the webisodes, and I would use the lesson plans and study guides often. They're written in a way that I can use them as-is, other times just as support. I like the activities you've built in, as well as just going over the lesson plan to enhance the webisode. (5th grade teacher)*
- *In our district, we have to indicate the standards being followed when making our lesson guides. That made this material extremely friendly and easy to use as a teacher. When you click on the standards, it directs you right to the webisode it corresponds to. That linking is invaluable. (6th grade teacher)*
- *The “Camouflage and Color” lesson went right along with our textbook in the beginning, as it talks about animals. (5th grade teacher)*
- *I thought it was information-packed and easy to use. (8th grade teacher)*
- *The lessons are great because they have a lot of higher-order thinking. (5th grade teacher)*

- *Kids tend to tune me out when I'm teaching vocabulary, but when the videos do it with visuals, they (kids) can grasp it a lot better. (5th grade teacher)*
- *I have not seen a better website on oceanography. My students would love exploring each webisode. (3rd grade teacher)*
- *This will definitely help my students enjoy science – we need a lot more websites like this. [...] Marine life is very important to the ecosystem. It also ties into saving our planet and lessons like that. I love it, it's excellent. (5th grade teacher)*
- *It's hard to find websites that have this much detail and beautiful webisodes. (3rd grade teacher)*
- *Links to other videos is an excellent idea. (Director of Education for a maritime center)*
- *Oh, my students would love them! He's funny, it's very family-oriented, they're great. That's what I liked about it. It drew me in, and still was scientific. (6th grade teacher)*

Some teachers suggested adding other national standards, as well:

- *It would be great to include math standards, too. (High school teacher)*
- *I suggest using the Next Generation Science Standards. The Science Standards listed on site are from the National Standards before the latest NGSS draft out in May 2012 and are too general. (Director of education for a maritime center)*

Teachers generally agreed that the resources were best suited for middle school students, although some teachers reported that the resources could be used with 4th graders or high school students with some adaptations:

- *One could use some of the videos with high schoolers as well. The information is that which would help high schoolers to review terms. We have to make sure they not only get concepts, but remember them. These videos are very useful for a “take it easy” day to help retention. (Middle school teacher)*
- *I think they could also be useful in the elementary level, considering the loosely structured lesson plans. Elementary teachers also don't often*

have a hard science background, and they are looking for things to be already made and available, like an educational video. (8th grade teacher)

- *My own son, who is in college, watched the videos with me and now he liked them so much that he has downloaded them from iTunes. (Middle school teacher)*
- *I think, for an elementary level, the lessons are a bit advanced. I think this would fit more middle school students. I would have to break down each lesson and pick out the important items. (3^d grade teacher)*

Some teachers reported that their students did not live near the ocean and that the *Blue World* resources could help them understand it better:

- *We're in the inner city and a lot of my kids come from low-income families, so these lessons are their extension to 'real life'. They can get excitement from these videos at least. (5th grade teacher)*
- *I think the kids would love the videos. My students generally have a very low level of life experience. Even though we're only two hours away from the ocean, many of my students have not seen it. They've especially not been to any aquariums or seen sea life. We would definitely use the videos. (5th grade teacher)*
- *Here in Western Pennsylvania, our kids aren't really knowledgeable about oceans and ocean life. (8th grade teacher)*

Some teachers expressed concern that the materials or recommended supplies might not always be available to them. Teachers suggested that it would be helpful to add a list of alternative supplies or a list of places where supplies may be purchased.

- *Sometimes on the activities, the supplies would not be available or I'd have to purchase them. That would sometimes concern me. (5th grade teacher)*
- *I think some modifications could be made to the section about shells, I don't always have access to shells. (5th grade teacher)*

Some elementary school teachers suggested that the vocabulary might be too advanced for their students:

- *About vocabulary, I think some is a little harder and some isn't at our state standards. Many of my students are bilingual, so scientific terms are harder for them to adopt into both languages. (5th grade teacher)*

Teachers found the webisodes easy to use and download:

- *I already put some on my iPhone. (5th grade teacher)*

One educator struggled to navigate the website when she searched for content by concept or grade level.

- *I just know how teachers are going to look at this. They're going to be most interested in the concept and the grade level. It was really hard to navigate through the site from my point of view as a curriculum builder. The actual content is very good, but you need to figure out the level and concept that's gone over, for teachers [...] There should be a place in the lesson where you have the matrix and the concepts illustrated according to the National Standards, but also how it relates to the lesson plan in a particular grade level [...] maybe you just say "this is a middle school curriculum", and then all of your lesson plans are for that target. (Director of Education for a maritime center)*

A couple of educators noted that there may be some factual inaccuracies, but were more concerned with the question of who developed the resources and whether scientists or educators had been involved in their development. One educator suggested making it more obvious that the resources have been reviewed by expert advisors.

- *It's important to make that more obvious for teachers to know – that the material has been looked at and 'vetted' by scientists. (Director of Education for a maritime center)*
- *I never really got a sense of if it was non-profit, or who he was etc. I saw it was NSF-funded, which was helpful, but are they private or what? (6th grade teacher)*

Finally, one teacher noted that she was surprised the lesson plans did not start with students making predictions:

- *I thought it was interesting he didn't have kids make a prediction at the beginning of the lab. That was a little "off." (6th grade teacher)*

Website Visitor Survey Findings

We asked website visitors to give the website a grade, from A to F. Most respondents gave the website an A (79%) or a B (17%).

Table 11:
Visitor Grades for Website

Grade	Number (%) (N = 48)
A	38 (79%)
B	8 (17%)
C	2 (4%)
D or lower	0 (0%)

We asked website visitors to report which areas of the website they were most interested in visiting. As summarized in Table 12, the majority of visitors were interested in viewing *Blue World* episodes online (83%). Other features that were of interest to roughly half of the visitors (46%) were the Photo Gallery and Sea Stories as well as the Study Guides for Educators (42%).

Table 12:
Website Areas of Interest

Website areas	Number (%) (N = 48)
Watch episodes	40 (83%)
Photo gallery	22 (46%)
Sea Stories	22 (46%)
Study guides	20 (42%)
Lesson plans	17 (35%)
Meeting our team	14 (29%)
Our blog	9 (19%)
Additional resources	5 (10%)
Shopping	4 (8%)
Booking a lecture	3 (6%)
All of the above	5 (10%)

Respondents reported on additional resources that they would like to see on the *Blue World* website. The most popular ones were: more videos (75%), more information about how to help the ocean (44%), more photos (42%), and more facts and data (40%).

Thirty-one percent of respondents were interested in seeing quizzes, while 23% were interested in other interactive applications (like ways to share their own stories).

Respondents were also interested in more informational resources, such as slideshows (31%), articles (29%), and other educator resources (25%) (Table 13).

**Table 13:
Additional Website Resources Visitors Would Like to See**

Website Resources	Number (%) (N = 48)
Videos	36 (75%)
Information about how to help the ocean	21 (44%)
Photos	20 (42%)
Facts and data	19 (40%)
Quizzes	15 (31%)
Slideshows	15 (31%)
Articles	14 (29%)
Educator resources	12 (25%)
Interactive applications (ways to share my own stories)	11 (23%)
Interviews	8 (17%)
Audio stories	7 (15%)
Other: Behind the Scenes	1 (2%)
Other: Information about saltwater pests	1 (2%)
Other: Information about sharks	1 (2%)
Other: Opportunities to Skype with experts	1 (2%)

In addition to delivering ocean science content via the website, we asked visitors what other delivery mechanisms they preferred. Half of respondents indicated that they preferred to receive ocean science content via television or e-mail. Slightly less than one-third (31%) reported they would prefer to use YouTube, and even fewer reported they wanted to receive ocean science content via Facebook (19%), Smartphone apps (15%), or text messages (10%).

**Table 14:
Best Ways to Deliver Science Content to Visitors**

Delivery Mechanism	Number (%) (N = 48)
TV	24 (50%)
E-mail	24 (50%)
YouTube	15 (31%)
Facebook	9 (19%)
Smartphone apps	7 (15%)
Text message sent to your phone	5 (10%)
All of the above	5 (10%)
Twitter	4 (8%)
Additional resources: Newsletter	1 (2%)
Additional resources: slideshows or printable worksheets	1 (2%)

Given that the audience for the *Blue World* website spans all age groups, we wanted to assess the degree to which the website content was appropriate for its visitors. To do this, we asked respondents to indicate how difficult the content was for them. As summarized in Table 15, two-thirds of respondents (67%) reported that the website content achieved the right balance between basic and challenging. Twenty-one percent reported that some of the content was too basic for them, while 13% reported that all of the content was too basic for them. No one reported that the content was too challenging for them.

**Table 15:
Website Content Appropriateness**

Content Difficulty	Number (%) (N = 48)
The web content achieved the right balance between basic and challenging	32 (67%)
Some of the web content was too basic for me	10 (21%)
All or most of the web content was too basic for me	6 (13%)
Some of the web content was too challenging for me	0 (0%)
All or most of the web content was too challenging for me	0 (0%)

Nearly all of the respondents indicated that they planned to visit the *Blue World* website again (96%) and would recommend the website to others (90%). The remaining respondents were unsure whether they would visit again (4%) or recommend it to others (8%). Only one respondent reported that they would not recommend the website to others because, as they reported, “no one they know would be interested.”

Respondents reported:

- *We LOVE your site. Keep up the great work. Thank you for sharing what you do with us.*
- *I enjoyed turning the station and learning about sharks in the sea through the colorful lens of Jonathan, and thrilled to learn a colleague and friend was also part of the team.*
- *I'm a PADI instructor from England who uses your materials when teaching students of all ages not just diving. We go into schools and teach about the ocean and how we can help to save it.*
- *You help bring my classroom and passion to life.*
- *I'm impressed, I'll definitely start using your site in September.*
- *Love the Roku channel, a happy subscriber! More episodes, please!*
- *I love your website.*
- *Loved it!*
- *Very nice – keep up the good work!*
- *Everything you do is so cool!*
- *You guys are tremendous!*
- *Love what you do!*

Summary

Findings

- Most students reported that they learned “a lot” from the videos (55%) and the in-class lesson (60%) and “a little” from the website (90%).
- Most students reported that they found the *Blue World* website (85%), videos (90%), and the in-class lesson (80%) to be interesting.
- Students reported that the *Blue World* resources were useful because they “helped them think about what they already knew, involved math and science skills, and enabled them to visualize the ocean without having to just imagine it.”
- Students also reported that they found the webisodes to be “fun and entertaining.”
- Sixty-five percent of students reported that *Blue World* made them *more* interested in studying and learning about oceans.
- Thirty-five percent of students reported that the resources made them *more* interested in protecting the oceans.
- Most students (60%) reported that *Blue World* made them interested in learning more about ocean science and that *Blue World* was “right” for most kids at their grade level.
- Students were evenly split over whether they would want to do more *Blue World* activities in their classrooms.
- Only a minority of students reported that they were interested in a career where they could explore the ocean (20%), planned to visit the *Blue World* website (15%), watch *Blue World* episodes (25%), or tell their friends about *Blue World* (10%).
- All the teachers (100%) reported that they were likely to use the *Blue World* resources next year and to recommend the resources to other teachers. They all found the webisodes to be “highly appealing,” “very well-done,” and “extremely interesting to watch.”
- Teachers generally agreed that the resources were best suited for middle school students, although some teachers reported that the resources

could be used with 4th graders or high school students with some adaptations.

- Some teachers reported that their students did not live near the ocean and that the *Blue World* resources could help them understand it better.
- Some teachers expressed concern that the materials or recommended supplies might not always be available to them.
- Some elementary school teachers suggested that the vocabulary might be too advanced for their students, especially those in elementary schools.
- We asked website visitors to give the website a grade, from A to F. Most respondents gave the website an A (79%) or a B (17%).
- The majority of visitors were interested in viewing *Blue World* episodes online (83%). Other features that were of interest to roughly half of the visitors (46%) were the Photo Gallery and Sea Stories as well as the Study Guides for Educators (42%).
- The most popular resources that website visitors would like to see added were: more videos (75%), more information about how to help the ocean (44%), more photos (42%), and more facts and data (40%).
- Half of the respondents to the Website Survey indicated that they preferred to receive Ocean Science content via television or email. Slightly less than one-third (31%) reported they would prefer to use YouTube, and even fewer reported they wanted to receive ocean science content via Facebook (19%), smartphone apps (15%) or text message (10%).
- Two-thirds of respondents (67%) reported that the website content achieved the right balance between basic and challenging. Twenty-one percent reported that some of the content was too basic for them, while 13% reported that all of the content was too basic for them. No one reported that the content was too challenging for them.
- Nearly all of the respondents indicated that they planned to visit the *Blue World* website again (96%) and would recommend the website to others (90%).

Recommendations

- **Add a list of low-cost, commonly available alternative materials for the lesson plans. In addition, consider providing links or the names of places where more difficult-to-find materials may be purchased.** All educators in the study reported that they would likely need to make modifications to the lesson plans and in-class activities for their students' particular needs or due to the perceived cost of supplies. In fact, we noted such modifications were made during our classroom observations.
- **Make it clear that Educator Resources – such as lesson plans, study guides, and webisodes – are available from the sections of the website called “National Science Standards” and “Ocean Literacy Principles.”** For example, the links on the “For Educators” page could be changed from “National Science Standards” to “Find webisodes, lesson plans, and study guides organized by National Science Standards,” or something to that effect. Some educators in our study reported that they didn't realize that there were educational resources available in these sections and thought they simply contained a summary of the standards.
- **Make it clear that the lesson plans are intended for middle school use on the website itself, before teachers search for and download resources.** Some educators reported that they were confused about how to search for resources by grade level or what grade level the resources were designed to target. While this information is contained in each of the lesson plans, it would be more efficient to provide this information to website visitors as they search. For example, the links called “Lesson Plans” could be changed to “Lesson Plans for Middle School” or “Lesson Plans, Gr. 6-8,” or something that that effect.
- **Add missing lesson plans to the downloadable summary sheet of lesson plan concepts** (<http://www.blueworldtv.com/images/uploads/lesson-plans/lesson-plan-table.pdf>). Missing from the sheet were: (1) Webisode 35 and (2) Webisode 46, for which there are existing lesson plans on the website. Also, consider re-organizing the sheet so that it is listed from highest number to lowest number, to be consistent with the way resources are listed on the website.
- **Revise the language on the study guides page so that it is clear that not all webisodes have an accompanying study guide.** The text on the study guide page currently reads “Each webisode has an accompanying study guide.” However, there are several webisodes that do not (such as Webisode 50, for example). One of the educators we

interviewed was confused by this, expecting all webisodes to have study guides.

- **Consider adding the search engine to the lesson plan and study guides pages.** Some educators reported that they liked the search feature for webisodes, but that they struggled to conduct a similar search for just study guides or lesson plans. While the PDF summary of the lesson plans is useful, it does not contain the same information (e.g., standards) as the webisode search feature.
- **Test the search engine to ensure it works reliably.** One educator mentioned that she tried to use the webisode search feature to find a webisode she had watched earlier, but it did not show up as a search result. CEG tested the search engine with the terms “clams” and “killer clams” and observed that no search results were returned, even though “Killer Clams” is the name of one webisode and “clams” are the main topic.
- **Consider including other standards, such as National Math Standards.** Educators reported that the resources would be even more useful if other standards were added, too.
- **Consider adding a note on the Educator pages that acknowledges that scientists and educators have reviewed the educational resources.** Educators reported some confusion about who developed the resources.
- **Consider adding more videos, information on how to help the ocean, photos, and facts and data.** These were the most commonly requested website additions.
- **For now, don’t consider creating smartphone apps or using text messaging to deliver content to audiences.** So far, these delivery methods are the least preferred ways to receive ocean science content among website visitors.

Appendix A: Student Survey

Student Survey

The questions below ask you to share your thoughts about *Jonathan Bird's Blue World (Blue World)*. Thank you!

Please mark the boxes to tell us how much you *learned* from the different *Blue World* materials:

	Nothing	A little	A lot	Did not do
1. The <i>Blue World</i> website taught me...				
2. The <i>Blue World</i> video(s) taught me...				
3. The in-class <i>Blue World</i> lesson (when you caught "fish") taught me...				

Please mark the boxes to tell us how much you *were interested in* the different *Blue World* materials:

	Not interested at all	A little interested	Very interested	Did not do
4. The <i>Blue World</i> website				
5. The <i>Blue World</i> video(s)				
6. The in-class <i>Blue World</i> lesson (when you caught "fish")				

Please mark the boxes to tell us how much you agree or disagree with the following sentences:

	Strongly disagree	Disagree	Agree	Strongly agree
7. <i>Blue World</i> made me interested in learning more about ocean science.				
8. I believe that our oceans need to be studied and explored by scientists so we can learn about them.				
9. I believe that our oceans need to be protected and taken care of.				
10. I would like a job like Jonathan Bird's – one where I can explore the oceans.				
11. <i>Blue World</i> was right for most kids at my grade level.				
12. I would like to do more lessons like the <i>Blue World</i> lessons in school.				
13. I will visit the <i>Blue World</i> website from home.				
14. I will watch <i>Blue World</i> on television,				

	Strongly disagree	Disagree	Agree	Strongly agree
on the web, or from iTunes.				
15. I will tell my friends to watch <i>Blue World</i> .				

16. Did *Blue World* change your interest in studying and learning about oceans?

- a. It made me more interested
- b. It did not change my interest – I was always interested in it
- c. It did not change my interest – I was never interested in it
- d. It made me less interested

17. Did *Blue World* change your interest in protecting the oceans?

- a. It made me more interested
- b. It did not change my interest – I was always interested in it
- c. It did not change my interest – I was never interested in it
- d. It made me less interested

18. How old are you? _____

19. Are you a:

- a. Boy
- b. Girl

20. What races or ethnicities do you identify with?

- a. White or Caucasian
- b. Hispanic or Latino/a
- c. Black or African-American
- d. Asian
- e. Other: _____

21. What kind of job would you like to do when you grow up?

Appendix B: Student Group Discussion Protocol

Student Group Discussion

[After survey]

1. Can someone start by telling me something new that they learned from *Blue World*?
 - a. What new facts did you learn?
 - b. What new ideas did you discover?
 - c. What surprised you about what you learned?
2. Are these the kinds of things that you normally learn about in school? Or was this something completely different? Please explain.
3. How many of you told your parents about *Blue World*? (Show of hands) Tell me about that ...
4. How many of you have watched *Blue World* on TV, or downloaded it from iTunes, or watched it on the web since last week? (Show of hands) Tell me about that ...
5. How many of you told your friends about *Blue World*? (Show of hands) Tell me about that ...
6. Was *Blue World* appropriate for your age level? If not, do you think it's better for younger or older people?
7. In what ways did the Study Guide help you learn? (Show Study Guide) Please explain ...
8. In what ways did the in-class activity help you learn? (Show Lesson plan) Please explain ...
9. In what ways did the video(s) help you learn? (Describe videos, if needed) Please explain ...
10. In what ways did the website help you learn? (Show screenshot of website homepage) Please explain ...
11. What did you like best about *Blue World*?
12. How could they make *Blue World* better?

Appendix C: Teacher In-person Interview Protocol

Teacher Interview

1. Please describe your approach to integrating *Blue World* into your curriculum.
 - a. Which *Blue World* resources did you use?
 - b. How did you use them?
 - c. Did you follow the lesson plan exactly or did you make modifications? Please explain ...
2. Overall, what worked and what didn't?
3. Specifically, how helpful to you were the following? For each one, please explain ...
 - a. Website
 - b. Webisodes
 - c. Study guides
 - d. Lesson plans
 - e. National Science Standards
 - f. Ocean Literacy Principles
 - g. Curriculum-based Videos
4. In what ways, if any, did *Blue World* change your interest in using hands-on activities in your classroom?
5. Please comment on the students' level of engagement in the:
 - a. Website
 - b. Video(s)
 - c. In-class activity (Lesson plan)
 - d. Other (Describe any other activity/resources used)
6. How appropriate were the resources for your students? Please explain ...
7. Did you review any other materials?
 - a. If so, which ones?
 - b. What were your impressions about their usefulness? Appropriateness for your students?
8. How likely are you to use the *Blue World* resources again? Please explain ...
9. How likely are you to recommend the *Blue World* resources to other teachers? What grade levels, subjects?
10. What improvements could they make to *Blue World*?

Appendix D: Teacher Telephone Interview Protocol

Teacher Telephone Interview

1. What grades do you teach?
2. Please describe how you might approach integrating *Blue World* into your curriculum.
3. Which *Blue World* resources would you use?
4. How might you use them?
5. Would you follow the Lesson plan exactly or would you make modifications? Please explain ...
6. What concerns do you have, if any?
7. Specifically, what did you think of the following? For each one, please explain ...
 - a. Website
 - b. Webisodes
 - c. Study guides
 - d. Lesson plans
 - e. National Science Standards
 - f. Ocean Literacy Principles
 - g. Curriculum-based Videos
8. In what ways, if any, did *Blue World* change your interest in using hands-on activities in your classroom?
9. How engaged do you think students will be in the:
 - a. Website
 - b. Video(s)
 - c. In-class activity (Lesson plan)
 - d. Other (Describe any other activity/resources)
10. How appropriate are the resources for your students? Please explain ...
11. Did you review any other materials? If so, which ones? What were your impressions about their usefulness? Appropriateness for your students?
12. How likely are you to use the *Blue World* resources? Please explain ...
13. How likely are you to recommend the *Blue World* resources to other teachers? What grade levels, subjects?
14. What improvements could they make to *Blue World*?

Appendix E: Website Visitor Survey

Website Visitor Survey

1. What areas are you interested in exploring on our website? (Check all that apply)
 - a. Watch episodes
 - b. Photo Gallery
 - c. Study Guides
 - d. Lesson Plans
 - e. Sea Stories
 - f. Meeting our Team
 - g. Booking a Lecture
 - h. Our Blog
 - i. Shopping
 - j. Additional Resources
 - k. All of the above

2. In the future, would you like to see more: (choose all that apply)
 - a. Interviews
 - b. Articles
 - c. Videos
 - d. Quizzes
 - e. Slideshows
 - f. Photos
 - g. Audio stories
 - h. Educator resources
 - i. Interactive applications (ways to share my own stories)
 - j. Information about how to help the ocean
 - k. Facts and data
 - l. Other: _____

3. Beyond visiting the *Blue World* website, how else could we send you ocean science content?
 - a. TV
 - b. E-mail
 - c. Text message sent to your phone
 - d. Twitter
 - e. Facebook
 - f. YouTube
 - g. Smartphone apps
 - h. All of the above
 - i. Additional resources: _____

4. Please give us a grade ... how well did the web content teach you about the topics you explored?
 - a. A
 - b. B
 - c. C
 - d. D or F (Explain: _____)

5. How appropriate was the web content for your level of knowledge?
 - a. All or most of the web content was too basic for me
 - b. Some of the web content was too basic for me
 - c. The web content achieved the right balance between basic and challenging
 - d. Some of the web content was too challenging for me
 - e. All or most of the web content was too challenging for me

6. How did you hear about Jonathan Bird's *Blue World* website? (Choose all that apply)
 - a. TV
 - b. Web search
 - c. Someone told me about it
 - d. Referred from another website (please list the site below)
 - e. My teacher
 - f. Other: _____

7. How often do you visit our website?
 - a. Several times per month
 - b. A couple times per month
 - c. A couple times per year
 - d. Almost never
 - e. This is my first time

8. Do you plan to visit our website again?
 - a. Yes
 - b. Maybe
 - c. No (please explain)

9. Would you recommend our website to others?
 - a. Yes
 - b. Maybe
 - c. No (please explain)

10. Please use this space to enter any additional comments or questions:

11. Are you male or female? (This is only to learn the demographics of our audience. Your name is never attached to any of this.)
 - a. Male
 - b. Female

12. What age range are you in? (We're just trying to learn what age groups like our content. No personal information is attached.)
 - a. 6 – 10 years old
 - b. 11 – 15 years old
 - c. 16 – 18 years old
 - d. 18 – 29 years old
 - e. 30 – 39 years old
 - f. 40 – 49 years old

- g. 50 – 59 years old
- h. 60 – 69 years old
- i. 70+ years old

13. How would you describe your race/ethnicity? (Choose all that apply)

- a. White
- b. Latino/a or Hispanic
- c. Black
- d. Asian
- e. Other: _____

14. What is your highest level of education?

- a. Currently in elementary, middle, or high school
- b. Some high school, no diploma
- c. High school graduate (or GED)
- d. Some college
- e. Associate degree or certificate program
- f. Bachelor's degree
- g. Master's degree
- h. Professional degree
- i. Doctorate degree

15. Are you a teacher?

- a. No
- b. Yes, early childhood educator
- c. Yes, grades K-2
- d. Yes, grades 3 – 5
- e. Yes, grades 6 – 8
- f. Yes, grades 9 – 12
- g. Yes, college level
- h. Yes, an informal educator
- i. Yes, a homeschool educator