SUMMARY OF BIG HISTORY PROJECT RESEARCH
2014/15 SCHOOL YEAR
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Introduction

Over the 2014/15 school year, the Big History Project (BHP) conducted studies to measure (1) student growth in writing, (2) student understanding of content drawn from history and the sciences, (3) student and teacher attitudes about and toward BHP courses, and (4) possible impact of BHP on students in subsequent years. We use these studies to ascertain the impact of the courses on students and teachers and to determine areas that need modification and additional attention.

All lines of research point to favorable results related to the quality and rigor of the course, especially those related to student writing, long-term recall of BHP content, and reported use of BHP literacy skills. In addition, student and teacher perceptions of the course are generally positive, confirming the strength of BHP as a foundational course for preparing students for future studies not only in history, but across the disciplines.

This report is divided into four sections. The first two focus on the analysis of the BHP student writing and student performance on standardized assessments of knowledge, completed by the University of Michigan. The third section reports survey findings of teacher and student perceptions and attitudes toward the course. The fourth section, completed by an independent researcher, summarizes case-study data that explored the long-term impact of participation in BHP.

Section 1: Improvement in Student Writing in BHP Courses

Analysis of BHP students’ writing over the 2014/2015 school year shows substantive growth from the beginning of the course to the end, as the data presented in Figure 1, below, demonstrates. Since BHP courses are reading- and writing-intensive, the BHP project team designed the instructional procedures and routines to assist teachers and students to meet Common Core and College Ready Literacy Standards. We offer a summary of the results, after a brief explanation of the data collection and analysis procedures.

Data Collection and Analysis

The University of Michigan (UM) group collected and analyzed over 3,000 student essays in
three waves: Baseline (Wave 1), Midterm (Wave 2), and End-of-Course (Wave 3). With almost 1,000 students in each wave, UM evaluated a representative sample of students and schools participating in the larger design-partner population. Design partners are schools that have confirmed they are teaching the course and have agreed to submit data for this study.

Over the school year, BHP schools submitted student essays for three BHP Investigations:

- Wave 1– Investigation 2, “How and why do individuals change their minds?”
- Wave 2– Investigation 6, “How does language make humans different?”
- Wave 3–Investigation 9, “To what extent has the Modern Revolution been a positive or a negative force?”

Each Investigation required students to read, analyze, question, and corroborate a variety of informational and historical texts – including primary and secondary sources, data charts and tables, and images and infographics – and apply disciplinary concepts before constructing an evidence-based essay in response to the question. Teachers provided students with approximately 45 minutes to complete the essay in class, either on a computer or by hand.

The UM team anonymized these essays and prepared graders using inter-rater reliability procedures, including reliability checks, which were repeated during the grading processes. The graders analyzed student essays along four features of effective writing: reasoning, use of evidence, use of disciplinary content, and writing mechanics. Common Core Writing Standards framed five levels of performance for each of the four features:

- Inadequate: Three or more grades below ninth-grade to tenth-grade level
- Developing: Two grades below ninth-grade to tenth-grade level
- Proficient: One grade below ninth-grade to tenth-grade level
- Skilled: At the ninth-grade to tenth-grade level
- Exceptional: At the eleventh-grade to twelfth-grade level

The BHP Investigation process aligns with the C3 dimensions of inquiry and the rubrics UM used correspond to the Common Core and College Ready Writing Standards for History, Social Studies, Science, and Technical Subjects.
Analysis of Student Writing

The overall growth in student writing from the beginning of the year to the midterm was quite remarkable. As Figure 1 shows, initially over 84 percent of the students scored at least two grade levels below the ninth-grade to tenth-grade level, a number that dropped to 66 percent by the middle of the course. By the end of the year, this number had dropped to 45 percent. Put differently, 15 percent of students were considered proficient or higher at the beginning of the year; by the end of the year, this number had increased to almost 55 percent. This is a dramatic gain.

![Figure 1. Overall change in writing scores.](image)

Similar gains are seen when we separate three of the assessed features of student writing: reasoning (Figure 2); use of evidence (Figure 3); and writing mechanics (Figure 4). Use of disciplinary content (Figure 5) had modest gains.
Reasoning (Figure 2): Data on ways the students built reasoned arguments show that at the beginning of the course, 32 percent of students scored proficient or higher; by the end of the year, this had increased to 83 percent.

Figure 2. Improvement in reasoning scores.

Use of Evidence (Figure 3): Only 26 percent of students were considered proficient or higher in use of evidence at the beginning of the year; over 80 percent scored in that range at the end of the year.
Writing Mechanics (Figure 4): Writing mechanics also showed exceptionally strong growth. At the beginning of the course, over 50 percent of students scored at least two grade levels below the ninth-grade to tenth-grade level. By the end of the year, this number had dropped to 8 percent. In other words, at the end of the year, 92 percent of BHP students scored proficient or higher.
Use of Disciplinary Content (Figure 5): Students demonstrated an increased capacity to use disciplinary concepts and facts to explain their reasoning. At the onset of the study, over 65 percent of students were performing at least two grade levels below the ninth to tenth grade, a number that had only dropped to 47 percent at the end of the school year. Compared to the other three measured features of writing – reasoning, evidence, and mechanics – students did not demonstrate as great an improvement in use of concepts, which leads us to identify this an area for future work.

![Figure 5. Use of disciplinary content scores.](image)

Discussion of Writing Findings

What explains the growth in students’ writing abilities and their capacity to structure an argument and use evidence and concepts to support their claims? First, BHP courses are reading- and writing-intensive. Students encounter a wide range of informational texts, including primary and secondary sources, graphs, data arrays, and images. The curriculum calls on students to write frequently, using a variety of writing genres including informal writing, narratives, explanations, and arguments. Second, the BHP resources and teaching guides offer successful routines for reading, evaluating, and analyzing texts, and scaffolds that progress in sophistication. Third, BHP provides teachers and students with approximately four different reading levels for all
texts, providing a built-in opportunity to differentiate the curriculum while ensuring that students have equal access to the content. Fourth, BHP used Common Core, C3, and College Readiness Standards to design the courses, with the specific purpose of producing progress in students’ writing, reading, and thinking.

Of course, BHP teachers are the main reason for the growth we have been seeing. Still, it is reasonable to assume that BHP course design, resources, teaching guides, and the consistent teacher support the BHP team provides, all play a vital role in explaining the reported progress in students’ writing, reasoning, use of evidence, and disciplinary concepts.

There are, however, two caveats regarding the limitations of this report. First, we have no way of knowing if the baseline data accurately represent student performance at the outset of the course. Since we do not have other data, such as student GPAs or reading scores, we have no way to determine if the low performance at the outset is typical.

Second, we do not know how teachers presented each of the assessments or how faithful they were to enacting the course as designed. Either might skew the data we’re reporting.

With those caveats, the writing BHP students produced at midterm and at end-of-course does demonstrate that BHP provides an opportunity to learn the content valued by the Common Core and College Readiness Standards, and that BHP teachers are using at least some of the course materials to provide students with necessary instruction.

Section 2: Student Mastery of Historical and Scientific Content

BHP courses introduce students to a wide range of historical and scientific content, content that aligns with other standards documents, such as National Standards in World History and the Next Generation Science Standards. To determine how well students are learning such historical and scientific content, the BHP team designed two Concept Assessments, which teachers give to students at midterm and the end of the course. The Concept Assessments consist of short-answer identifications and multiple-choice questions drawn from released items on externally normed exams, such as the National Assessment of Educational Progress (NAEP), College Board’s Advanced Placement Exams (AP), Scholastic Aptitude Subject Matter Tests (SAT-Sub) and state-level assessments (for example, New York Regents Exams). We no longer give
a baseline Concept Assessment so we contrast BHP students’ performance with the released items pulled from NAEP, AP, SAT-Sub, or state exams. Again, the results are encouraging.

BHP students in general seem to perform as well as if not better than the general population on the specific items. For example, 95 percent of BHP students correctly answered an NAEP question on the abundance of elements in the Solar System, as compared to 70 percent on the NAEP. On an NAEP question concerning the properties of all galaxies, 61 percent of BHP students answered correctly as compared to 41 percent of the NAEP students. We found similar results for questions pulled from SAT-World History text. For example, 70 percent of BHP students were able to assess accurately statements about overland trade between world zones in the pre-modern era, as compared to 54 percent of the SAT-World History students.

We do not want to overstress these results, however, because in some cases BHP students scored about the same or even a bit lower than other students on such content-specific questions. The scores suggest two things to us. First, that in addition to all the other things that BHP courses accomplish—such as improving students’ literacy and critical thinking skills, and offering students usable, coherent frameworks—the course also helps students learn some important historical and scientific content at least as well as other, more traditional courses do.

Second, student performance on the Concept Assessments has also stimulated the BHP team to analyze and then modify the related course resources and instructional supports to see how we might improve student understanding of core content drawn from history and the sciences.

Section 3: Teacher and Student Attitudes about BHP Courses

BHP students and teachers take surveys at the beginning, in the middle, and at the end of the course to help us understand the attitudes and perceptions of the course by those taking or teaching it. Focusing on interest, engagement, and attitudes toward course content and resources, the surveys provide the BHP team with information about participants’ overall impressions, as well as attitudes toward specific lessons, resources, and activities. As the data below show, teachers and students are engaged with the BHP courses and report high levels of satisfaction with it.
**Data Collection**

The BHP team collects survey data from students and teachers at three points throughout the school year (beginning, middle, and end) to ascertain participants’ views of the course. To help students feel comfortable being honest about their perceptions of the course, their survey data are submitted anonymously. Teacher survey data are not anonymous.

**Teacher Attitudes and Perceptions of BHP courses**

Teacher satisfaction with the course is remarkably high and has steadily improved since the 2013/14 school year. Last year, over 90 percent of teachers reported being satisfied with the course, would recommend it to students and other teachers, and enjoy teaching the course (see Table 1), which is an increase over previous years.

<table>
<thead>
<tr>
<th>TEACHERS</th>
<th>Overall Course Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=21</td>
</tr>
<tr>
<td>Course Satisfaction</td>
<td>83%</td>
</tr>
<tr>
<td>Would Recommend</td>
<td>94%</td>
</tr>
<tr>
<td>Prepare for Future</td>
<td>69%</td>
</tr>
<tr>
<td>Enjoy Teaching BHP</td>
<td>85%</td>
</tr>
<tr>
<td>Student Staying Engaged</td>
<td>75%</td>
</tr>
</tbody>
</table>

Table 1. Overall teacher satisfaction with BHP.

More specifically, well over 85 percent of the teachers reported being satisfied with the course materials, the teacher resources, the relationship with the BHP project team, and the website’s ease of use (Table 2). While such numbers are encouraging, the BHP continues to follow up with teachers to improve the product and services.
Table 2. Teacher satisfaction with teacher support materials.

As Table 3 demonstrates, BHP teachers also reported that teaching the courses had an impact on their teaching and increased their confidence in teaching interdisciplinary content, reading, writing, and research, as well as history and the sciences.

Table 3. BHP impact on teacher practice.
**Student Attitudes and Perceptions of BHP courses**

While not as strong as the teachers’ response, students also had very positive attitudes toward the BHP courses. Last year, two-thirds of the students reported being satisfied with the course, enjoyed learning the content, and thought it would help them in the future. About 40 percent of the students reported that they enjoyed the course more than other courses and expressed that it stimulated an interest in science.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Course Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=686</td>
<td>n=1,022</td>
<td>n=2,931</td>
<td>n=2,495</td>
<td>n=2,030</td>
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<tr>
<td>Course Satisfaction</td>
<td>53%</td>
<td></td>
<td>65%</td>
<td>66%</td>
<td></td>
</tr>
<tr>
<td>Would Recommend</td>
<td></td>
<td>64%</td>
<td>59%</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Enjoy Learning</td>
<td>63%</td>
<td>53%</td>
<td>68%</td>
<td>64%</td>
<td>66%</td>
</tr>
<tr>
<td>Enjoy More Than Other Classes</td>
<td></td>
<td></td>
<td>42%</td>
<td>36%</td>
<td>39%</td>
</tr>
<tr>
<td>Future Science Interest</td>
<td>45%</td>
<td>38%</td>
<td>37%</td>
<td>35%</td>
<td>41%</td>
</tr>
<tr>
<td>Future History Interest</td>
<td>29%</td>
<td>24%</td>
<td>25%</td>
<td>22%</td>
<td>24%</td>
</tr>
<tr>
<td>BHP Will Help</td>
<td>55%</td>
<td>43%</td>
<td>66%</td>
<td>59%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Table 4. Overall student satisfaction with BHP.

These data are further supported by written responses to the surveys. For example, one ninth grader wrote:

*I feel that Big History has helped me expand my overall view of the creation of the universe and how each large event was dependent upon many other circumstances. For sure, it has given [me] an incredible new ability to analyze others speech and writing!!!! I know key turning points in time and have developed a new sense of looking at all of my academic subjects. It has opened my mind to a way of thinking that will [a]ffect me for the rest of my life, I am pretty sure no other course has that special ability. It is almost as if this class “turned-on” another part of my brain that was previously untouched. I can better comprehend the reasoning and importance of an event in time, and therefore have a more*
intricate method of thinking. I can logically make a decision based on evidence and logic to why something in history has occurred. Studies today are all about memorizing things to better improve your education, this class doesn’t prepare me so much for those, but this class is so brilliant it has given me a new enthusiasm and appreciation to the Universe and the knowledge it has to offer.

When considering how BHP courses affected their academic skills, the students had high praise. As Table 5 shows, over 85 percent of the students said BHP courses positively affected their skills in critical thinking, reading, research, writing, technology, and research, while over 80 percent said it influenced positively their presentation skills. Student perceptions of the impact of BHP courses on their intellectual skills correspond well with the achievement data from the Text-Based Writing Assessments and the Concept Assessments.

One student seemed to capture the way most students saw the course, writing: “Big History allowed me to think about what I was learning, instead of just memorizing dates and times. It challenged me to actually learn. Big History also helped me learn how to look at things from all aspects.”

<table>
<thead>
<tr>
<th>STUDENTS Impact of BHP</th>
<th>2015 W2</th>
<th>2015 W3</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=130</td>
<td>n=83</td>
<td></td>
</tr>
<tr>
<td>Critical Thinking Skills</td>
<td>88%</td>
<td>88%</td>
</tr>
<tr>
<td>Presentation Skills</td>
<td>80%</td>
<td>82%</td>
</tr>
<tr>
<td>Reading Skills</td>
<td>91%</td>
<td>90%</td>
</tr>
<tr>
<td>Research Skills</td>
<td>97%</td>
<td>87%</td>
</tr>
<tr>
<td>Writing Skills</td>
<td>91%</td>
<td>85%</td>
</tr>
<tr>
<td>Technology Skills</td>
<td>95%</td>
<td>89%</td>
</tr>
</tbody>
</table>

Table 5. BHP’s impact on students.
Discussion of Survey Findings

Student and teacher perceptions of and attitudes toward BHP courses are quite positive. Although we’re excited by this data, we are also mindful that most of the teachers volunteered to teach BHP or BHP-World History, and thus were likely excited from the outset. Even so, it’s encouraging that the courses lived up to and in some cases exceeded their expectations. As more schools assign teachers to teach the course, we might see a dip in some of the teacher attitudes toward it. Of course, in all likelihood teacher enthusiasm impacts student enthusiasm and might also help explain the student scores. Further, most of the design partners realize they are participants in the creation of this project and thus might be more likely to complete the surveys or encourage their students to do so than other teachers. Thus, we are cautiously optimistic about these results and look forward to learning more as project participation increases.

It is noteworthy, though a bit puzzling, that although teacher satisfaction rose throughout the year, student satisfaction, though positive, remained relatively flat. We can only speculate about why this occurred, and we intend to monitor student satisfaction closely in order to learn more.

Most heartening were teacher reports that BHP changed their instructional practice. The BHP has made heavy investments in the “just-in-time” online professional development led by members of the teaching community, and nowhere near as much in face-to-face professional development. Typically, BHP provides one in-person training per region, per year. All professional development is delivered online through the BHP project team and active online teacher community, which is hosted on a Yammer site. The BHP designed the course to be educative to teachers as well as students, and thus built in regular, daily opportunities for teachers to learn from the resources, content experts, and each other.

Section 4: Case Studies of Impact of BHP*

To gain greater insight into how teachers and students experienced the BHP courses and to ascertain how BHP courses might have had an impact on students beyond their year in the course, we engaged an independent researcher who visited four BHP schools and interviewed current and former BHP students, teachers, and administrators.

* For more detailed information about the case studies, please email help@bhp.com.
These in-depth studies of four BHP sites confirmed and extended much of the information gleaned from the achievement assessments and the surveys. In addition, because we were able to learn how students who had taken BHP courses one year to three years earlier thought about their experiences, we learned something about BHP’s longer term effects. In short, the researchers discovered that BHP students could recall course content years later, and students reported being able to use the skills and concepts they had learned in BHP courses both in and out of school.

Further, the case studies indicate the value of teachers taking the stance of “lead learner,” a stance that appears to influence students’ interest in history and science.

**Data Collection**

The researcher visited four schools on the East and West Coasts of the United States. All the schools had offered BHP courses for at least three years. We also wanted to include a range of schools and thus selected two schools that qualified for Title I funds and two that did not. The researcher interviewed 248 current or former BHP students, and 28 teachers and staff from the schools. Table 6 offers more information about the schools in the study.

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>SCHOOL A</th>
<th>SCHOOL B</th>
<th>SCHOOL C</th>
<th>SCHOOL D</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Enrollment</td>
<td>1400</td>
<td>685</td>
<td>800</td>
<td>2750</td>
</tr>
<tr>
<td>Rate of Free and Reduced Lunch</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
<td>38%</td>
</tr>
<tr>
<td>Total Student Participants</td>
<td>98</td>
<td>51</td>
<td>74</td>
<td>25</td>
</tr>
<tr>
<td>Ninth-Grade BHP Students</td>
<td>27</td>
<td>17</td>
<td>26</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 6. Case-study participant demographics.**

Three main sources of data were collected for this study: semi-structured interviews with students, teacher interviews, and classroom observations.

- **Student Interviews**—The focus of these interviews was student perceptions of Big History Project and how the skills and content learned in the course impacted their experiences in other courses as well as outside of school.
Teacher and Staff Interviews—BHP teachers were asked about their experiences with the course over time, with a focus on which BHP concepts they taught with the most fidelity. Staff were interviewed regarding their perceptions of BHP.

Classroom Observations—These were conducted to triangulate reports related to fidelity to BHP concepts.

The researcher had the interviews transcribed and generated codes used for analysis. Once a final list was established, researchers double coded a subset of the data to establish 90 percent inter-rater reliability. Case studies were written individually, and then a cross-case analysis was completed.

Findings

Individual case studies produced the following findings

- BHP students report increased engagement with history and science, which suggests changes in their academic trajectories.
- BHP students have a high level of knowledge recall and retention.
- BHP teachers and students reported they used ideas, concepts, and skills learned in BHP in and out of school, suggesting transfer.
- BHP teachers assuming role of lead learner had a positive impact on student engagement.
- Students reported greater interest in and use of BHP skills and concepts in classrooms that employed the BHP conceptual frameworks.

Reported increased engagement in history and the sciences. Students who took BHP courses reported being more interested in history and liking it more after the BHP course. In some cases, students reported that their experiences in BHP encouraged them to take more difficult history courses. Interest and engagement are often one of the most important precursors for learning. Research on student interest suggests that engagement in any topic can positively impact a student’s trajectory, regardless of course choice, helping them stay engaged with future courses.

High rates of knowledge recall. Students were able to recall more concepts and content from BHP courses than other courses taken at the same time. Figure 6 shows the percentage of students who recalled more, less, or the same BHP content than other courses. In three of the four case studies, more than 60 percent of BHP students showed they remembered
more concepts and ideas from the BHP course than other courses. The one outlier – a school where only 37 percent of the students remembered more BHP content than other courses – also appeared to greatly modify the BHP course structure, suggesting far less fidelity to BHP content than the other three. Thus, the majority of students in high-fidelity implementations (to be discussed in the next section) reported remembering more from BHP than from their other courses and were able to talk about the BHP content and concepts in detail. Some students talked about the major concepts in BHP such as thresholds of increasing complexity, the Big Bang, and origin stories, but they also remembered more detailed information such as accretion and the formation of stars, and particular activities such as Big History on a Football Field and the Hunter-Gatherer Menu. Students often don’t remember details about past course content, and this supports findings that the class was engaging, and also suggests a depth of student learning.

Figure 6. BHP alumni-reported content recall.

*Reported transfer of skills and content.* BHP students reported they were able to transfer knowledge and skills learned in BHP to other settings, in and out of school. Transfer of learning is one of the most important measures in education since we expect (and hope) that knowledge and skills have meaning and utility beyond a single course, term, or school year. Long after taking the BHP course, students reported using concepts, such as collective learning and thresholds, and skills, such as evaluating claims, reading texts, and making arguments, in other courses. Students and teachers claimed to see BHP’s impact on students’ reading, writing, research,
critical thinking, questioning, discussion, debate, collaboration, presentation, and perspective-taking. Figure 7 shows how many times students mentioned using what they learned in BHP in other classes.

![Transfer](image)

**Figure 7. Frequency of transfer of skills and content.**

*Teacher as lead learner.* Teachers who assumed the stance as “lead learner” rather than an all-knowing authority appeared to have had a positive impact on students in the BHP course. Since it is not reasonable to expect any teacher to have mastery of all the BHP subject matter, the BHP project team and instructional resources strongly recommend this pedagogical stance. The course encourages teachers to model not only curiosity but also ways to use and hone their skills as they work with and alongside students to tackle BHP’s “big questions” and concepts. In short, both teachers and students are well challenged by the BHP course, which is one of its virtues. The case studies suggests that when teachers took this lead-learner stance—assumed authority as a co-learner rather than as a dispenser of knowledge—students reported feeling more respected, engaged, and empowered to do the work needed in BHP.

*Conceptual frameworks.* In addition to setting out to design an engaging and dynamic course responsive to learners (both secondary students and teachers), the BHP team sought to create a course that might be an on-ramp to subsequent learning. Central to this goal were the BHP conceptual frameworks and analytical tools that enable students to make distinctions and organize ideas. The case studies revealed that when teachers explicitly used and emphasized the BHP frameworks—such as scale, thresholds of increasing complexity, claim testing, and multidisciplinarity—their students were more likely to recall course content and report using
BHP skills beyond the course than students in lower fidelity classrooms. In addition, students from classrooms using the BHP conceptual frameworks reported being able to make coherent connections to content they were learning in and out of school. In short, teachers’ explicit use of the central BHP conceptual frameworks appears to help students develop coherent meaning from their study of over 13 billion years of history.

Discussion of Case Study Findings

When we look across the findings as well as at other factors that were highlighted in each of the case studies, the following patterns emerge:

• Higher-fidelity implementations are strongly correlated to positive student outcomes, including long-term learning and retention.
• Student engagement with BHP increases when the teacher assumes the role of lead learner.
• BHP can provide a conceptual framework for all learning.

These cross-case findings support the individual case study findings, and help to explain the individual case study results. In addition, when similar outcomes are seen across schools we can more confidently generalize the findings to other BHP classrooms.

Impact of high-fidelity implementations. Big History Project is distinctive in part because it focuses on three essential skills and three key concepts (see Figure 8).

**Figure 8. BHP essential skills and core concepts.**
Of the four schools examined in this study, three maintained the same high fidelity to the big ideas in BHP that they had since the beginning of the course. Only one school had changes in fidelity over time, and this school reported having moved away from fidelity to the ideas and skills related to scale and interdisciplinarity, which we believe are vital for deep understanding of BHP. At this school, student findings were markedly different from the high-fidelity schools when examined over time. In all the high-fidelity implementations, student interest in, and engagement with history were maintained or increased. Students in high-fidelity implementations had notable levels of retention and transfer from the BHP course. In the highest-fidelity settings, students developed a conceptual framework for school, life, and learning.

Two limitations of this study exist. The first relates to convenience sampling: Not all students were available for interviews, which might have skewed findings. However, outcomes were similar across schools, which suggests there was, in fact, a representative sample of students.

The second limitation relates to reliance on teacher and student self reporting, particularly as it pertains to fidelity to course design, recall, and transfer of skills. However, the positive reports correspond with perception inventories the apocryphal data the project team has collected over the years, as well as research on the relationship between engagement and achievement reported in other studies.

It is important to note that the case studies did not seek to make causal claims about the singular impact of the BHP course on teachers and students. Rather, these studies provided us with on-the-ground detail not present in the writing samples or the perception inventories. We are using the information gained from the case studies to inform renewed BHP teacher professional development efforts and the focus of teacher training in BHP. Further, we have learned from this research that many BHP teachers and students see the course as a powerful and successful opportunity to engage students in thinking about big, enduring questions while developing their literacy and thinking skills, which encourages us to believe we are heading in the right direction.
Conclusions

The research presented shows that BHP courses help students learn to write better and think more critically. The course engages them, and prepares them for future studies. Students report that the course has had a long-lasting and positive impact on their learning, their ability to recall content, and their capacity to apply skills to new content and courses as well as to their lives outside of school. It appears that both teachers and students are energized and engaged by the way the BHP courses uses big questions, multidisciplinary content, coherent narratives, and text-rich Investigations to travel across nearly 14 billion years of time and the entire cosmos. The reports also offer support for the value of BHP’s approach to embed professional development within the course website and materials. The report offers some evidence that these supports and the lead-learner stance are enabling BHP teachers to teach a course they’ve never taken, one with much of its content drawn from beyond their expertise.

Since BHP’s beginning five years ago, we have used what we have learned from our students and teachers to modify the course. Although this report was quite positive, it helped us identify a number of areas in which we can improve. With the assistance of our teacher community, this knowledge will shape our work for the coming year.