



The Great Immensity:
Conveying Science through the Performing Arts
An Assessment



Prepared by
Ellen Giusti
August 2012

Table of Contents

EXECUTIVE SUMMARY	3
BACKGROUND	4
PURPOSE	4
METHOD	5
GENERAL AUDIENCE	5
STUDENT MATINEES.....	6
FINDINGS	7
OBSERVATION	7
THE AUDIENCE.....	7
COGNITIVE IMPACT	11
AWARENESS, UNDERSTANDING.....	11
<i>Causes</i>	12
<i>Effects</i>	12
<i>Solutions</i>	13
<i>Other Comments</i>	13
<i>Adult Responses</i>	14
<i>Student Responses</i>	14
<i>Students' Questions</i>	15
AFFECTIVE IMPACT	16
<i>Engagement</i>	16
<i>Changes in attitude and behavior</i>	21
TEACHERS' RESPONSES.....	22
ANCILLARY PROGRAM: SCHOLARS FORUM	24
<i>Description of the panel</i>	24
<i>Audience questions and comments</i>	26
<i>Survey Responses</i>	27
ANCILLARY PROGRAM: INTERACTIVE WEBSITE	28
<i>Users</i>	28
<i>Ratings</i>	29
FINAL THOUGHTS: ART + SCIENCE = INFORMED COMMUNITIES	33
APPENDIX 1. ADULT AUDIENCE DEMOGRAPHICS	34
APPENDIX 2. STUDENT AUDIENCE DEMOGRAPHICS	39
APPENDIX 3. SCHOLARS' BIOGRAPHICAL SKETCHES	40

EXECUTIVE SUMMARY

The Great Immensity is a play with music created by the New York-based theater company, *The Civilians*. With support from the National Science Foundation (NSF), this production explores humans' relationship to the environment—focusing on critical issues of conservation and climate change. It premiered at the Kansas City Repertory Theatre (KC Rep) from February 17 through March 18, 2012. This summative evaluation employs the *Framework for Evaluating Impacts of Informal Science Education Projects* (Friedman 2008) to assess the play and its ancillary programs' impact on adult and student audiences.

The main data sources were an online survey of the play's general audience (with a 43% response rate) and a paper survey distributed to students. The adults' responses were compared to the smaller student sample where relevant. Examples of major findings follow:

- Many more students than adults came away feeling “much more informed than before” (30% and 6% respectively). The same percentage of each group felt “about [as informed] as before” (41%) about the environment.
- Respondents' descriptions of “new science ideas” they took away from the play—*cognitive impact*—were divided into three categories: “causes of the ecological crises,” “effects on the planet and species,” and “solutions to the crisis.” The relative strength of each response category was the same in each sample: *effects* strongest, *solutions* next, and *causes* last.
- In terms of affective impact, the majority of both audiences found the play enjoyable and engaging. Two in three members of both audiences agreed, “The play and songs make the science exciting and understandable for non-scientists.” The vast majority of both audiences agreed, “The play and music can reach people who think they can't understand science.” When audiences were asked to choose from a list of words describing how the play made them feel, the two top choices in both samples were “informed” and “engaged” (in that order).
- Three of six statements that explored attitude toward environmental issues revealed disparities between the adult and student audiences (see Table 13). Many more adults than students were “deeply concerned about the impact of climate change on the natural world.” Likewise, more adults than students were “eager to learn more about what [they] personally can do for the health of our environment” and found the “connections between climate science and theater/the arts stimulating.” However, it should be noted that in response to additional statements about the environment that were not on the adult survey, the majority of students agreed, “People like me can have a positive impact on the environment,” and “I am deeply concerned that human behavior is causing extinction of plants and animals” (71% and 65% respectively, see Table 13a).
- After a Saturday matinee, a panel of three local scholar-activists took the stage to discuss their environmental research and activism, and their reaction to *The Great Immensity*. Observation indicated the audience's positive response; however, few attendees completed the online survey. Those who responded rated the program as “intellectually stimulating,” scoring it 6.22 out of a possible 7 points.
- A small sample assessed another ancillary program, *The Great Immensity* interactive website. Because the assessment took place during the website's development process, a follow-up evaluation is under consideration.

In conclusion, findings from observations, surveys, and ancillary programs indicate that *The Great Immensity* effectively engaged two diverse audiences and increased their understanding of environmental issues.

BACKGROUND

The Great Immensity is a play with music and video projections created by the New York based theater company, *The Civilians*. The play uses real stories and places to create a unique experience—part journalism, part inventive theater, and part scientific discourse—to explore our relationship to the environment, while focusing on critical issues of conservation and climate change. This national touring production premiered at the Kansas City Repertory Theatre from February 17 through March 18, 2012.

KC Rep operates two theaters: the Copaken Stage (where *The Great Immensity* was staged) and the Spencer Theater. The Rep produces six plays per season at the Copaken Stage. Works range from drama to comedy and contemporary pieces to classics. The 2011–2012 season started with *August: Osage County* and included: *The History of Kisses* (a world premiere), *The Adventures of Tom Sawyer*, *The Great Immensity* (world premiere), *The Whipping Man*, and *Little Shop of Horrors*, which ended the season.

Developed from research and interviews with scientists and local stakeholders, who have differing perspectives on the issues, *The Great Immensity* aims to convey science through an unconventional medium. Ancillary public programs that augmented the production included four student matinee performances followed by discussions with the cast, and panel discussions with cast members and local scholars offered to general audiences. Additionally, an interactive website (<http://thegreatimmensity.org>) follows the characters through their blogs and provides up-to-date resources on climate science and conservation.

PURPOSE

The project received support from the National Science Foundation's Informal Science Education program. Ellen Giusti, evaluator, was asked by *The Civilians* to examine the impact on the audiences' awareness of and attitudes toward the critical environmental and social issues addressed in the play. The intended impacts are assessed herein with reference to the *Framework for Evaluating Impacts of Informal Science Education Projects*. This summative evaluation explores the extent to which *The Great Immensity* conveys:

- Understanding that climate change is occurring and is affecting two specific, but very different ecosystems (including the animals and humans that inhabit them); awareness of why and how scientists study climate change and species endangerment, and the results of their work (*impact category: awareness, knowledge, and understanding*).
- Interest in and empathy for species that are under threat of extinction and for people who inhabit at-risk ecosystems (*impact category: interest and engagement*).
- Apprehension for the future of the planet and the need for stewardship of its ecosystems and organisms (*impact category: attitude*).
- The importance of becoming more concerned citizens who actively care for the natural world (*impact category: behavior*).

This report comprises:

1. The evaluator's observations of audiences at five performances: three in the evening and two matinees (one for local middle and high school students), and ancillary programs;
2. The adult and student audience perspectives of the play;
3. Teachers' perspective of the play's value for teaching and learning;
4. The audience perspective of an ancillary program—a local *Scholars Forum*;
5. Users' assessment of *The Great Immensity* website.

METHOD

GENERAL AUDIENCE

The Great Immensity had its world premiere at the Kansas City Repertory Theatre from February 18 through March 18, 2012. Evening performances took place daily (except Mondays) and matinees were held on Saturdays and Sundays. Four additional matinees were scheduled on Thursday mornings for middle and high school students.

Post-performance audience feedback was essential to the assessment. It was deemed logistically impossible to ask audience members to fill out surveys or respond to interviews in the theater after a performance because the theater is in the downtown area of the city and patrons who traveled relatively long distances needed to get in their cars and return home—particularly after weeknight performances. Fortunately email addresses were captured for almost the entire audience because KC Rep sells most of their tickets online. Therefore, we decided that the most efficient method of collecting thoughtful feedback would be through an online survey that patrons could respond to at their leisure, using their home computer.

We sent invitations to 1,356 patrons who attended performances between February 18 and March 11, 2012, asking them to participate in an online survey (www.surveymonkey.com) As an incentive, we offered participants a chance to win 2 free tickets to the next KC Rep production. The response rate was surprisingly high (43%) with 580 replies.

STUDENT MATINEES

Teachers who brought classes to the matinees were asked to give their students a questionnaire before and another after seeing the performance. This *pre-post* research design was intended to reveal changes in understanding and/or attitude resulting from attending a performance. Teachers were also asked to respond to an online survey about their perspective of the play's value for teaching and learning as related to their curriculum.

The *pre-post* method was foiled by teachers' lack of compliance (and the unlucky concurrence of the schools' scheduled spring break). We received over 300 pre-tests, but only 100 post-tests were



returned. Additionally, we had no way of finding out if any of them were from the same schools, or whether the pre-tests came from any of the several schools who brought students with behavioral or academic challenges. For these reasons we decided it would be impossible to infer change in awareness or attitude due to students' exposure to the play. We chose to ignore the pre-performance surveys and focus on the play's impact on students who attended *The Great Immensity*.

Figure 1. Student matinee audience

The spring break schedule may have been the primary culprit with respect to the research design and the dearth of teacher responses. Matinees took place just before the school vacation, making the timing of data collection from students and teachers highly problematic. Eight of twenty teachers responded to the survey (40% response rate)—they were on spring break too.



Figure 2. Student Talkback with actors

FINDINGS

OBSERVATION

The first performance I attended was a student matinee. Several hundred students, from different schools, arrived in buses. They were noisy while waiting in the lobby, but quieted down and appeared completely engaged once the play began. Each group had an assigned seating area. The rows in this theater are extremely raked so that everyone, no matter how far back, has a good view of the stage (Figure 1).

There was a *Talkback* session with the cast following the performance (Figure 2). Many of the classes stayed, though some had to leave. The KC Rep Director of Education and Community Programs introduced the cast members and served as moderator. What followed was a dialogue rather than a one-way *Q & A*, with cast and audience members giving personal perspectives about the meaning of the play. The actors talked about the characters they played and how they developed the role. The students asked about the actors' backgrounds. Much of the dialogue concerned *The Civilians*' creative method—interviewing scientists, local people and research, immersing themselves in the topic—and how music is integrated into the piece.

Adult audiences also appeared engaged during a general audience performance. They laughed where appropriate, and applauded some of the songs. *Anecdote*: Before the start of one of the performances, a woman seated beside me said she was a KC Rep subscriber but knew nothing about the play. She asked if I did. I replied that I knew quite a bit about it, and gave a brief overview. During intermission she said that *The Great Immensity* was one of the best plays she had seen there.

THE AUDIENCE

The Great Immensity, a play that aims to convey serious science content, focuses on unusual if not unique themes compared to other KC Rep productions. As Melinda McCrary, Director of Education and Community Programs at KC Rep, explains:

“The average attendance at a Copaken [month-long] show is about 7,000, depending on the title. *The Great Immensity*, with an attendance of 5,984, was under the average, but quite impressive, to me, given the generative and issue-oriented persona of the play. [The audience numbers] for *Little Shop of Horrors* were very high—10,202. A popular, well-sold musical.”

KC Rep invites local middle and high schools to bring students to special morning matinees. Four student matinees were performed by *The Great Immensity* cast, drawing a slightly larger audience than did the *Little Shop of Horrors* production, which held three student performances. Plays that were targeted toward young audiences (e.g., *The Adventures of Tom Sawyer* and *A Christmas Carol*: with seven and eleven matinees respectively) drew considerably larger student audiences.

KC Rep offers a conversation series for its general audience in conjunction with most productions—*Meet the Creative Team*, *Scholars Forum*, and *Actors Forum*. Attendance at these *Great Immensity* programs was similar to other KC Rep productions. The *Scholars Forum* drew more audience members after a Saturday matinee than did *Little Shop of Horrors*, but *Little Shop* drew a larger audience for its *Actors Forum*.

Half the 580 general audience respondents came to a performance in February and half in March. About three times as many respondents attended evening performances as matinees (73% and 27% respectively). Among both adult and student audiences, females were more likely than males to respond to the survey in almost identical proportions: adult respondents were 36% male and 64% female; student respondents were 35% male and 65% female. The KC Rep appears to attract an older audience: the majority of the adult respondents (59%) were 60 years and older, 23% were 50 to 59 years old, 10% were 40 to 49 years old, 5% were 30 to 39 years old, and 4% were 20 to 29 years old. (See Appendix 1 and 2 for complete demographic data.)

Although almost 700 students attended one of the student matinees, teachers returned only 103 survey responses (15% response rate). Half the student respondents were 16 years old (53%), 73% were in the 10th grade, and 15% were 17 and 18 years olds in grades 11 and 12. Eleven of the students were in middle school, between 12 and 14 years of age. A few younger home-schooled students also attended a matinee.

The KC Rep general audience is highly educated. More than half the respondents (58%) have advanced degrees, 31% have a BA or BS, 10% completed some college coursework, and only 1% are high school graduates. When asked to characterize their background in climate science and/or ecology 4% said their background was “extensive,” 41% said it was “moderate,” and 55% said their background in those sciences was “limited.” Among the 22 people who described their backgrounds in climate science or ecology as “extensive,” 16 could be deemed *professionals* and six *amateurs*.

Compared to their self-described science backgrounds, many more audience members described their arts and/or humanities background as “extensive” (22% compared to 4% for science); 63% said their background in the arts was “moderate”, and 16% “limited.” Many who claimed to have an “extensive” background in science also said they had an “extensive” background in the arts. Of the 88 people who referred to their arts background as “extensive,” 31 could be deemed *professionals* and the rest *patrons of the arts*. (See Appendix 1 for respondents’ self-identified “extensive” science and arts background

The adult audience’s self-described prior knowledge of climate change and conservation issues suggests that they are relatively well-informed: 3 in 4 characterized themselves as “somewhat knowledgeable” and 1 in 4 “very knowledgeable.” Just 1% described themselves as “expert,” and 2% said they “knew nothing” about it (Table 1).

Table 1. Before you came to this performance, how well-informed did you feel about climate change and conservation issues? (Adults, N=549)		
Answer Options	Percent	Count
Expert*	1%	3
Very knowledgeable	24%	132
Somewhat knowledgeable	74%	406
Know nothing	2%	8

*If “Expert” please specify (example: *My research began in 1970. I have over 400 publications and 4 textbooks.*)

Regardless of their prior knowledge, almost half the adult audience said they were “more informed” after seeing the play. Many more students than adults said they were “much more informed than before” (30% and 6% respectively). Table 2 shows that same percent of both audiences (41%) who said they were “somewhat more informed” than before. As to feeling knowledgeable, almost twice as many adults as students said they felt “about the same as before” seeing *The Great Immensity* (52% and 28% respectively).

Table 2. How knowledgeable do you feel after seeing <i>The Great Immensity</i> ?				
Answer Options	Adults (N=548)		Students (N=102)	
	Percent	Count	Percent	Count
Much more informed than before	6%	34	30%	31
Somewhat more informed	41%	227	41%	42
About the same as before	52%	287	28%	29

Responses suggest that KC Rep general audience members are active in the cultural life of the city. Virtually all respondents (98%) attended other KC Rep productions. Some 27% said they attend educational events at museums, zoos, aquariums, and/or science centers frequently; 55% said they attend occasionally; and just 18% said they attend these events rarely.

The student audience presents a very different picture. For most of them this was their first experience seeing a play at the KC Rep. Only 6% of the students said they “frequently” attend educational programs in museums and other cultural institutions, 41% said they attend them “occasionally,” and 53% said “rarely.”

Where do KC Rep audience members look for or come across information about environmental issues? Table 3 illustrates where adult audience members get information about the environment and Table 4 illustrates the resources that students trust for environment-related information.

Table 3. Where do you get most of your information about the environment? N=542		
Answer Options	Percent*	Count
Newspapers	74%	400
Magazines/journals	70%	379
Television	67%	363
Internet	56%	305
Books	42%	228
Environmental organizations	35%	189
Family and friends	27%	144
Museums	20%	110
Radio, NPR, PBS	9%	51
School and teachers	6%	33
Religious leaders	3%	18
Other: Travel, observation	1%	5

*Percents add up to more than 100 due to multiple citations. Thirty-eight people skipped the question.

Although the general audience and student questions regarding their sources of information are similar, they are not identical and thus could not be compared in a single table. Instead of asking students where they get *most* of their information about the environment (the question on the adult survey), we asked students for their *most trustworthy* source. Thus, adults cited many more sources of information and cannot be compared side by side to student responses.

Table 4. Which do you trust most for information about the environment? N=102		
Answer Options	Percent	Count
TV	22%	22
Newspapers	14%	14
Internet	14%	14
Environmental organizations	12%	12
Books	10%	10
School & teachers	8%	8
Magazines/journals	7%	7
Family & friends	7%	7
Government	4%	4
Religious leaders	1%	1

Perhaps not surprisingly, television is students' number one source for trustworthy information on the environment. Television is adult respondents' third choice, following newspapers and magazines/journals. Newspapers are the number two trustworthy source of information for students (followed by the Internet) and the adults' fourth choice. Religious leaders are the last source cited by both groups for environmental information.

COGNITIVE IMPACT

In terms of demographic characteristics, despite the disparities between the adult and student audiences (the adults much older with many more years of formal education, the student population much more culturally and intellectually diverse) and number of responses, their answers to questions about the play’s impact were not far apart. This is plausible because *The Great Immensity* was created as an entertaining medium for conveying scientific ideas. Its target audience is not science content experts or people with advanced academic degrees. One of its major goals was to engage and inform people who might not likely identify themselves as consumers of science information. While the number of responses from each audience cohort is disparate and the demographics dissimilar, because the project aims to increase the general public’s engagement with and understanding of the issues, it is useful to compare the play’s impact on these two diverse audiences.

Awareness, Understanding

To evaluate the impact on their awareness, knowledge, and understanding (as per the NSF *Framework*) we asked audience members to describe one “new science idea” they took away from *The Great Immensity*. The majority of both student and adult audiences took the time to write open-ended responses, which were then categorized by topic and subtopic. The major topic categories we identified were “causes of the ecological crisis,” “effects on the planet and species,” and possible solutions.

Many people were moved by and described the impact of climate change on biodiversity—the polar bears in the north, the monkeys in the south, and even the danger to humans—they remembered from the play. Several people commented that they did not learn anything new, but the play reaffirmed what they already knew. Tables 5, 6, 7, and 8 illustrate the major categories and subtopics within them, followed by examples of each, in respondents’ own words.

Major Categories	Adults N=308		Students N=67	
	Percent	Count	Percent	Count
Causes of ecological crisis	21%	66	10%	7
Effects on the planet and species	36%	110	43%	29
Solutions to the crisis	32%	99	37%	25

Note the similarity in Table 5 of the relative strength of adult and student responses in each major category, which reflects the play’s relative emphasis on each of these categories. The plot (story line) and songs in *The Great Immensity* focus primarily on the *effects* of climate change in the Panamanian rainforest and the sea ice environment of Churchill, Manitoba, in Canada. The story also focuses on what might compel world leaders to change their environmental policies, the importance of communicating their changing behavior to the public, and the need to respect the research provided by scientists (*solutions*). Thus, it is not surprising that fewer audience members

took away ideas about the causes of the worldwide ecological crisis than about the effects on the planet and potential solutions.

Table 6. Causes of the ecological crisis				
Subtopics	Adults N=66		Students N=7	
	Percent	Count	Percent	Count
Canal's impact on climate and ecology	46%	26	29%	2
Gulf stream story	30%	17	-	-
Caused by human activity	21%	12	71%	5
Population explosion	14%	9	-	-
Canal's impact on global economy	4%	2	-	-

Causes

Adult Responses

I had not previously thought about the manmade Panama Canal and its relationship to climate change—altering ocean flows and promoting global shipping which, then, has its own impact on our environment.

The theory of the climate changes that resulted from when central America came in contact with South America causing the gulf stream and warmer climates in Europe.

"We are all Panamanians" is a new one to me. The potential enormity of creating the Panama Canal is one ecological idea I had never run into before.

Student Responses

I never realized the Panama Canal affected the climate so much.

I never realized how much damage our species is doing to the world.

I never realized that I had a huge affect on climate change.

Table 7. Effects on the planet and species				
Subtopics	Adults N=110		Students N=29	
	Percent	Count	Percent	Count
Impact on species (including humans)	39%	43	17%	5
Impact on environment (global perspective)	34%	37	52%	15
Speed of change, imminence of crisis	15%	17	28%	8
Impact on society, cultures (contingency)	9%	10	-	-
Interconnectedness of Earth systems	6%	7	-	-

Effects

Adult Responses

Polar bears may become extinct due to starvation. This is as a result of the melting of the ice that they need to walk on to get to their food source.

The shipping lanes across the poles are shorter and will be used more as the ice caps melt.

We have 50 years at the current rate of change before things go critical.

The islands created when the Panama Canal was built have isolated species that have had to adapt to island life. The melting of the polar ice caps may create similar islands for humans.

Student Responses

I never realized how bad we are treating the earth and animals.

50 years! So little time. We must change now.

I never realized that the climate change had such a huge impact on our world.

It reminded me that the ice caps are going to melt sometime soon and decrease the landmass for people and animals.

Table 8. Solutions to the crisis				
Subtopics	Adults N=99		Students N=25	
	Percent	Count	Percent	Count
Individual action	18%	18	28%	7
Long term goals	10%	10	8%	2
Public understanding/education	22%	22	28%	7
Scientific research	21%	21	16%	4
The need to act now	22%	22	4%	1

Solutions

Adult Responses

[I learned] that if we don't do something, we may not be able to continue normal living on this planet.

...that we all need to double, or triple our efforts and tell as many other people to get on the band wagon now before it is too late...

The scientific information I took away from the performance was, you as an individual should do your part to be a GOOD STEWARD of our natural resources.

Personally, I think I can make a difference by recycling and making good ecologic choices, but the play made me feel pretty pessimistic about the long term.

Student Responses

I never realized that I can affect or help out.

I never realized how much goes into climate research....

I never realized that kids cared about climate, science, and theatre.

Other Comments

Not all responses referred specifically to science; some reflected on the environmental issues presented in the play. The following is a selection of adult responses:

This is more geographic than scientific, but I didn't realize how expansive the Panama Canal is, beyond the locks. I liked the concept of "contingency" —that where we live and even that we live as well as what our world is like is all due to various contingencies.

More psychology than science: that the reason people aren't motivated to do anything about global warming etc. is that they don't perceive it as a current threat that needs action, but something that will occur at some undefined point in the future.

More of a factoid than a science idea, but I found the part dealing with the bird at the Cincinnati Zoo to be one of the best parts of the play. I didn't know anything about that, it was quite interesting.

I didn't realize how little I knew about the Panama Canal. I was very taken with the footage of the ship moving through the canal. I knew nothing of research on the island.

I was profoundly shocked by the time-lapse temperature increase global map video—I know the cycle will only get faster, but the graphics you included in the play were arresting and unforgettable.

Respondents quoted some of the more powerful ideas directly from the script: 64 adults and 4 students mentioned Panama and the rainforest specifically; 33 adults and 6 students mentioned ideas about the arctic, melting ice and permafrost, and the plight of the polar bears; and 11 adults and 2 students specifically referred to the “50 years” that remain before the crisis was irreversible. A few adults remembered the play’s reference to the population doubling since Kennedy was president, and several others mentioned “contingency” and “We are all Panamanians.”

A few adults commented on the need for educating the public and our inability to understand long-term consequences of our actions (or inaction). Adults and students registered surprise that people need to be faced with immediate, personal, and extreme circumstances to do something for the environment. Two students referred to “environmental terrorism.”

Adult Responses

Humans have trouble making decisions now about long-term consequences. Not really new to me because this is a foundational principle of human behavior that I teach (I'm a Psychology Prof) but it was great to see it dramatized for the layperson.

Not really a science idea, as I'm pretty well tuned into what's happening with the whole global warming/climate change debate, but I was surprised how strongly I was hit with the idea that something has to happen to people for real behavioral change to happen. That's not a new idea, and it's not new to me either, but the way in which it was addressed in the musical impacted me greatly.

Student Responses

I never realized that it took losing something you care about to see what is going on around you.

I never realized that it would require such a drastic movement to make society care.

Eight adults were skeptical about human-caused climate change—some were actually deniers!

Not all of the information presented was accurate.

I didn't take any new science ideas away. I was distracted by the obsolete climate science promulgated by the play.

I didn't think it was a scientific presentation but rather a depiction of a specific point of view.

None. I don't believe in the global warming hoax.

Although there is much debate on how and to what degree human influence has on global weather, the “green” ecology groups are far more narrow minded and radical in their beliefs as to the causes.

Students' Questions

Teachers collected students' responses in their classrooms—perhaps days after they had seen the performance. Similarly, the online adult audience survey responses were not completed immediately following their experience at the theater. Many student questions concerned the characters and focused on the actors' relationship to the play, thus appearing to be influenced by the post-performance discussion with the cast. Examples of their questions follow.

About the story

Was Polly really a twin?

Did this actually happen?

Why would you make the big thing the actor was trying to figure out not very probable?

Would you guys actually suggest kidnapping kids just to make a point?

I would like to know what happened to the kids in The Great Immensity?

Did the mom and dad rescue the girl?

What was the conclusion of the play? I didn't understand the ending?

About The Civilians

I would like to ask why they made up the play and who made the play.

What was your inspiration?

Why did they add music?

Were the actors/actresses actually passionate about global warming?

Do the cast members recycle?

How long did it take to produce the play.

Are you traveling to other countries to perform?

About the message

[I want to know] more about Charismatic Megafauna. Although it was mentioned frequently, I don't think the audience got a clear definition.

Do any of you believe in global warming?

How can we change global warming?

Wouldn't you agree that this climate change is simply another earth cycle? The earth's rotation pattern is an oval so of certain [times] we will be closer to the sun than normal.

Where did they receive all of the info on global warming?

AFFECTIVE IMPACT

Engagement

Based on the NSF *Framework*, “understanding and awareness” reflects cognitive impact and “engagement and interest” speaks to affective impact. To begin to explore *affective* responses to *The Great Immensity*, audience members were asked how enjoyable they found it—“very enjoyable,” “moderately enjoyable,” or “not enjoyable.” Results are shown in Table 9.

Table 9. How enjoyable did you find <i>The Great Immensity</i> ? (N=555)				
Answer Options	Adults N=555		Students N=102	
	Percent	Count	Percent	Count
Very enjoyable	35%	193	18%	18
Moderately enjoyable	44%	242	75%	75
Not enjoyable	22%	120	9%	9

Interestingly, there was virtually no variation in adult responses by education level, or science and/or art backgrounds. The majority of adults and students found the play “moderately enjoyable.” Perhaps *enjoyable* was not the best adjective to use when asking audience members to describe *The Great Immensity* because the message was disturbing; even people who found it moving, engaging, and/or stimulating might not say it was “very enjoyable.” The majority of adult attendees would recommend the play to friends (54%) and slightly fewer (40%) would recommend the play to family members (students were not asked this question).

Many responses that allude to the play’s cognitive impact on its audience reveal its affective impact as well. The urgency respondents feel about climate change’s effect on the environment and on species is evident in many of the “new science ideas” they cited. Although the play aims to convey relevant science to audiences who were not predisposed to seek out the information in a lecture, journal, or other strictly informational format; too much science might turn off the very audience it was hoping to attract. Was the play too *science-y*—did audiences feel it was not entertaining? We asked the general audience and they responded that there was not too much (or too little) science in the play: three in four adults (74%) said there was “about the right amount of science.”

A survey question asked whether the play’s format—employing music, video projections, and humor—was an effective medium for conveying science, elicited positive responses. Adult and student responses were identical: 2 in 3 respondents (67%) believed that “the play and songs make the science exciting and understandable for non-scientists,” while only one in three (33%) believed the play and songs “trivialize and oversimplify the scientific issues involved” (Table 10).

Table 10. Which of the following comes closest to your opinion?				
Answer Options	Adults N=521		Students N=78	
	Percent	Count	Percent	Count
The play and songs trivialize and oversimplify the scientific issues involved.	33%	172	33%	26
The play and songs make the science exciting and understandable for non-scientists.	67%	349	67%	52

The great majority of adult and student respondents agreed, “The play and music can reach people who think they can’t understand science” (90% of adults and 78% of students). Two in three people in both audiences agreed, “The play and music can reach people who think they can't understand science” (Table 11).

Table 11. Which of the following comes closest to your opinion?				
Answer Options	Adults N=519		Students N=90	
	Percent	Count	Percent	Count
The play and music can reach people who think they can't understand science.	90%	465	78%	70
The science in the play was at a level too high for the average person to understand.	10%	54	22%	20

The play was created on the premise that conveying science through the arts can reach people that are *turned off* by the complexity of scientific data. In addition, the play promotes the notion that each person is part of the natural world and must understand the importance of stewardship. These responses support the notion that the arts can reach people who may not think they are interested in science. A dramatic presentation may succeed in personalizing a complex topic that people, who believe they can’t *do science*, might reject out of hand in another medium.

Two adult respondents wrote:

A reminder that we tend to ignore statistics (which is how climate change is often relayed to an audience), therefore we do not realize or act on the ‘immensity’ of the problem at hand.

There was a reinforcement of the great importance of science and caring and doing and, of course, using new means such as theatre to inform all of us, The Great Immensity.

Both adult and student audiences were asked to choose as many words as applied from a list that best described how the performance made them feel. The list was randomized in the online survey (adults), but not on the students’ paper questionnaires. The lists of words were not identical on the two surveys. Table 12 illustrates the results (the greyed out areas signify that the word was not included in that population’s list). Figures 3 and 4 use *word clouds* to graphically illustrate the frequency of word choices.

Table 12. Check all the words below that describe how the performance made you feel.				
Answer Options	Adults N=552		Students N=98	
	Percent	Count	Percent	Count
Informed	42%	231	58%	57
Engaged	35%	194	34%	33
Worried	33%	182	21%	21
Curious	30%	164	57%	56
Pessimistic	30%	165		
Bored	29%	160	39%	38
Stimulated	26%	142	17%	17
Touched	25%	136	22%	22
Puzzled	23%	125	0	0
Confused	20%	108	43%	42
Hopeful	16%	88		
Nervous	11%	60	0	0
Amused			42%	41
Fascinated			20%	20
Awe-struck			14%	14
Intimidated			5%	5
Distracted			0	0
Apprehensive			0	0
Intrigued			0	0



Figure 3. Adult *word cloud*

Figure 4. Student *word cloud*

Feeling “informed”—a cognitive impact—is the most frequent choice for both audiences (42% of adults, 58% of students); the same percentage of both audiences said the play made them feel “engaged”—an affective impact (35% of adults, 34% of students). Not surprisingly, twice as many students as adults felt “confused” (43% and 20% respectively): the adult audience was considerably older and highly educated. A greater percentage of students were “bored” (39% vs. 29%), while more adults than students said they felt “stimulated” (26% vs. 17%). Perhaps again,

related to age or educational achievement, more adults than students felt “worried” (33% vs. 21%) while more students than adults said the play made them feel “curious” (57% and 30% respectively).

To further delve into the audiences’ *affective* responses, respondents were presented with a series of statements and asked if they “agreed,” “disagreed,” or had “no opinion” (Tables 13 and 13a).

Table 13. Please indicate if you agree or disagree with the following statements, or if you have no opinion.						
	Agree		Disagree		No opinion	
	Adults	Students	Adults	Students	Adults	Students
I find the connections between climate science and theater/the arts stimulating.	71%	39%	11%	24%	18%	37%
Climate change and habitat destruction are related problems.	92%	79%	4%	9%	4%	12%
I fear that global warming could negatively affect my quality of life.	68%	63%	20%	23%	12%	15%
The environmental challenges are too big for people like me to make a difference.	17%	24%	76%	57%	8%	19%
I am eager to learn more about what I personally can do for health of our environment.	71%	45%	12%	24%	18%	31%
I am deeply concerned about the impact of climate change on the natural world.	84%	50%	10%	17%	7%	33%

Most adults and students found the “connections between climate science and theater or the arts stimulating” (71% and 39% respectively). While both groups also agreed, “climate change and habitat destruction are related,” fewer students than adults were “deeply concerned about the impact of climate change on the natural world” (50% and 84% respectively). About 2 in 3 people in each group feared the negative effect of global warming on their own lives. Both groups rejected the notion that the problems were too big for individuals to make a difference and both wanted to learn more about what they personally could do; however, the adults felt more strongly about these topics than did the students.

The students were asked to respond to four additional statements that were omitted from the adult survey (Table 13a).

Table 13a. (<i>Students</i>) Please indicate if you agree or disagree with the following statements, or if you have no opinion.			
	Agree	Disagree	No Opinion
I am deeply concerned that human behavior is causing extinction of plants and animals.	65%	11%	24%
People like me can have a positive impact on the environment.	71%	7%	22%
I want to learn more about science and scientists.	35%	31%	34%
I don't have anything in common with scientists; they would not be interested in talking to me.	22%	45%	33%

The majority of students agreed with the first two items in Table 13a, indicating that after all, they are deeply concerned about the environmental crisis—particularly human responsibility—and that they believe their behavior could have a positive impact on it. Responses to the next statement in Table 13a (“I want to learn more about science and scientists”) are disappointing: only 1 student in 3 said they wanted to learn more about science and scientists. However, on a more positive note, almost half the students (45%) disagreed that they “don’t have anything in common with scientists” or that scientists “would not be interested in talking” to them. Students’ questions (pg. 15) suggest that they identified with the Youth Ambassadors in the play. Likewise, they seemed to find common ground with the scientists who were portrayed as down-to-earth people with quirky personalities in natural settings, not clichés of scientists—old men in white coats isolated in high-tech laboratories.

Changes in attitude and behavior

Most members of the adult audience said they were “interested [in the environment] but not active.” Only 17% characterized their interest as “active in environmental organizations” (82% of 548 who responded to the question), and just 1% said they were “not interested.” Almost 2 in 3 (63%) said they would describe their behavior toward the environment as “green when it’s easy” rather than “very green” (36% of the adults). Only 2% said their behavior toward the environment was “not at all green” (Table 14).

Table 14. How would you describe your behavior toward the environment? (N=543)		
Answer Options	Percent	Count
Very green	36%	193
Green when it's easy	63%	341
Not at all green	2%	9

We wondered how the play might affect audience members’ attitudes or behavior toward the environment. As Table 15 suggests, although a substantial number of the adult patrons (37%) said they “want to learn more about what [they] personally can do,” more than half (54%) said they would “probably not” change anything about their behavior. Students were split almost evenly on whether or not they would change their behavior.

Table 15. After seeing <i>The Great Immensity</i> , do you think you will change anything about your behavior toward the environment?				
	Adults N=542		Students N=101	
General Audience: Answer Options	Percent	Count	Percent	Count
I want to learn more about what I personally can do	37%	201	52%	52
Probably not	54%	295	49%	49
Other (please specify)	9%	46		

Among the 46 adults’ “other” remarks, close to half said they were already doing all they could. While we did not offer this as an option on either survey, I would argue that many of the “probably not” responses reflected the same reasoning. Some 1 in 5 “other” comments referred to the need to teach others—perhaps by bringing them to *The Great Immensity*—a few (13%) said the play was good reinforcement for what they already believed in. Three adults said they were skeptical about human responsibility for climate change.

Teachers' Responses

Twenty teachers received invitations to an online survey designed to explore their motivation for bringing students to a performance and their satisfaction with the outcome; eight responded.

Those who participated in the survey teach grades 8 through 12.

Teachers were asked why they brought students to *The Great Immensity*. The number one reason they gave was to expose the youngsters to live theater (Table 16).

Table 16. Why did you bring students to The Great Immensity? N=5 (Choose all that apply)		
Answer Options	Percent	Count
Expose students to live theater.	100%	5
Tickets were free.	50%	4
I am personally interested in the topic.	50%	4
Topic fits with our curriculum.	38%	3
I find the connections between climate science and theater exciting.	25%	2

Teachers rated *The Great Immensity* on a 5-point scale based on how “scientifically informative,” “esthetically enjoyable,” and “intellectually stimulating” it was. Figure 5 illustrates the mean ratings.

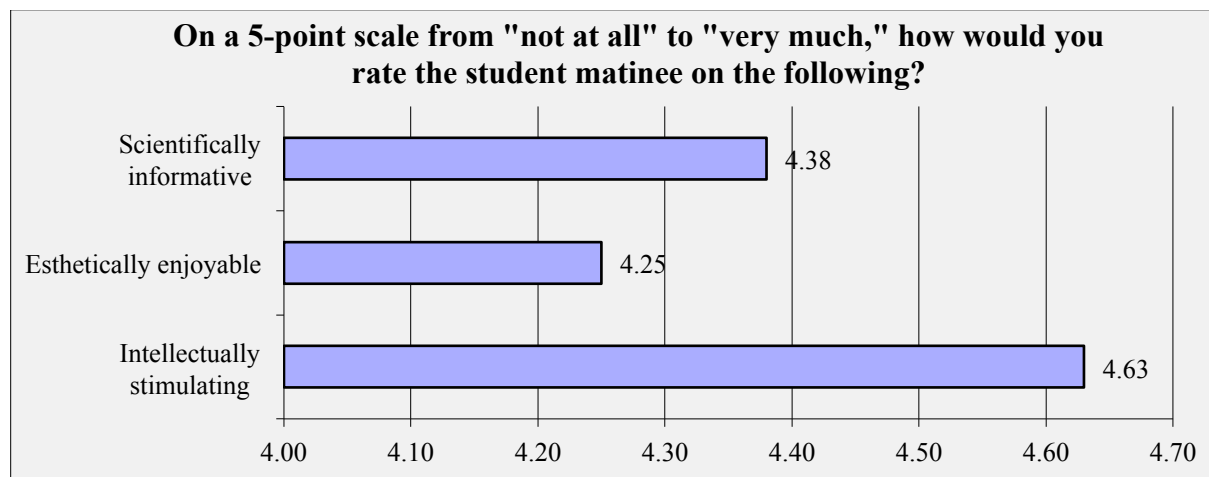


Figure 5. Teachers' mean ratings of aspects of aspects of *The Great Immensity*

Teachers rated the play highest for being “intellectually stimulating.” They rated it highly on being “scientifically informative” and slightly less on its esthetic appeal.

One of the teachers thought there was too little science in the play; two thought there was too much; and five said there was “about the right amount of science.” Four teachers wrote about *The Great Immensity*'s relevance to their curriculum:

Biodiversity/species extinction- causes of climate change.

The effect of climate on species and species' effect on the entire planet.

Climate change, immediate and long-term effects of global warming.

The impact of humans on the planet; climate change; interaction of organisms; the role of scientists.

Teachers rated the extent to which certain topics were conveyed in the play (Table 17). The topic they thought was most strongly conveyed was “the impact of human activity on the planet,” followed by “climate change will affect our quality of life.” Interestingly, teachers’ ratings conform to the students’ responses. Teachers rated less highly the play’s information about the causes of climate change as reflected in the adult and student audiences’ takeaway of “new science ideas.”

Teachers did not think the play conveyed to a great extent, “Individuals like your students can have a positive impact on the environment,” although the majority of students agreed that “People like me can have a positive impact on the environment,” and many said they wanted to learn what they personally could do. This suggests that teachers underestimate how concerned students really are and might consider bringing conservation ideas (beyond the blue recycling bins) into their classrooms. Teachers’ lower ratings of the statement “scientists are approachable, not so different from us” suggests that *The Great Immensity*’s portrayal of scientists could do a better job of making them seem more relatable.

Table 17. To what extent did <i>The Great Immensity</i> convey the following topics? (Choose all that apply) N=5					
Answer Options	To a great extent		Somewhat		Not at all
The impact of human activity on the planet.	6	1	1	0	0
Climate change will affect our quality of life	5	3	0	0	0
Climate change's relationship to the loss of biodiversity/species extinction	4	4	0	0	0
The causes of climate change/global warming.	3	3	2	0	0
Scientists are approachable, not so different from us.	3	3	2	0	0
Individuals like your students can have a positive impact on the environment.	2	4	2	0	0

Ancillary Program: Scholars Forum

A post-performance *Scholars Forum* took place on Saturday, March 3, 2012. KC Rep’s Director of Education and Community Programs organized the panel and introduced the three scholars involved in conservation research and environmental activism. They talked about their work and answered questions from the audience. (See Appendix 3 for the scholars’ complete biographical sketches.)

Description of the panel

Jane Gibson is Chair of the Department of Anthropology at University of Kansas. Dr. Gibson’s work sits at the intersection of people and ecosystems as she continues to ask: *how do people think about and interact with the non-built environment?* Her most current project engages Kansas farmers in a study of land and water use as these relate, among other things, to biofuels and climate change. She began her remarks with an analogy to the play, saying, “Most of us are like Phyllis, not Polly [green when it’s easy].” She went on to discuss the barriers to *action* in our society:

- The culture of our society today emphasizes individualism over community, competition over cooperation. Individualism leads to thinking *I am just one person—what can I do to make a difference? Nothing.*
- Consumption is so important: it defines a person’s identity.
- Our society believes that technology will fix everything; that some genius will come along and find a magic bullet. As Pete says in the play, “Technological fundamentalism”—the market will handle it.
- We live in a *digitally-mediated reality*—we don’t experience the natural world directly, thereby augmenting the distance between people and ecosystems. The media creates a *flattening out* of information so that we cannot tell the difference between crisis and comedy. The media filters our understanding through news and advertisements that encourage us to buy something to fix whatever ails us—to correct any and all deficits.

Considering these barriers, Dr. Gibson explained, it is the arts that can help us communicate and bring science to the public.

Caroline P. Davies, Associate Professor, Director Environmental Studies Program at University of Kansas is a biogeographer whose research focuses on the processes of climate change and human/landscape relationships from a wide range of spatial and temporal scales in the Middle East and the American Midwest.

Dr. Davies said, “As a scientist, the play speaks to me—the jargon and the jokes about the climate model and statistics.”

The students who take her course in environmental studies—because they need one science to graduate—find it very depressing. She wonders, “How can you engage them to understand human impact without turning off?” She suggested that the way is to bring science into other

arenas including art- and faith-based venues. The latter brings in the element of stewardship of God's creatures.

Environmental studies used to have 30 majors; now it has 200. She spoke of the importance of combining science and cultural values, and the importance of bringing the big ecological issues back to local conditions (e.g., water in Kansas City).

Dr. Davies explained:

“Global warming is too controversial, so now we talk about climate change. Like in The Great Immensity, people say, ‘What warming? Remembering last year’s snow?’ Computer models showing warming, etc. do not predict changes in precipitation. We have had fierce weather, violent storms.

Our national political process with its four-year cycle is too shortsighted to do anything. Local areas like cities are where adaptations can happen because they have to deliver water, heat, etc. Kansas City (KC) is doing a great deal to improve environment (she asked if audience members were aware of it and nobody was). People shut down when they hear data, like in the play. The US is the only place in the world not accepting climate change as a fact. Education is vital, but KC schools are in bad shape.

We have to move into the action phase, putting sustainability in practice. We have to get kids out of the mindset of just being depressed about environmental issues.”

Rabbi Moti Rieber has served as Director of Kansas Interfaith Power & Light since March 2011. The mission of Interfaith Power & Light (IPL) is to be “faithful stewards by responding to global warming through the promotion of energy conservation, energy efficiency, and renewable energy.” He is a long-time activist on peace, social justice, and environmental issues, and brings a variety of interfaith and organizational experience to the work of Kansas IPL.

He began by showing that day’s *US News*—highlighting terrible storms and gas prices (reaching \$4 plus, per gallon). He briefly touched on the Bible as a way to bring faith-based institutions to conservation: the Creation Story—God gives humans dominion over all living creatures but ends with the admonition to be good stewards; the story of Noah—God makes a covenant with Noah and his sons to protect all living creatures.

Rabbi Rieber is a climate activist. He goes to churches to convince them to go green, showing how to can save money with simple, inexpensive ways to reduce energy use (and expenses).

When he goes to politicians to advocate, he can’t even say *climate*. The issue has become politicized and supported financially by people who benefit from consumption. Rabbi Rieber stressed the need to address *demand*, not just *supply*. He explained, “This has been going on for 40 years and nothing gets done; remember the gas crisis in the ‘70s?. We have actually gone backwards: [while] old KC photos show a railroad station and other public transportation sources; the highway system supports subsidized oil and cars at the expense of public

transportation.” As a “liberal Jew” he is suspect, so he convinces other clergy to support pro-environment policies.

One thing he deems understated in *The Great Immensity* is the issue of global justice, stating, “The developing countries will get *wacked*. We have air conditioning, etc. —in developing countries the women do most of the farming and water carrying.”



Figure 6. (From left to right) Scholars: Rabbi Rieber, Dr. Davies, Dr. Gibson, and KC Rep Director of Education and Community Programs, Melinda McCrary

Audience questions and comments

Man: *You should show this play to the politicians in Washington.*

Davies: *I testify at the state and federal level and nothing happens. In cities action is possible.*

Gibson: *The money controls politicians. We need to get the word out though plays and other avenues.*

Man: *Are we doomed because of our culture of individualism?*

Gibson: *Cultures can and do change. Some cultures ostracize people who compete and do not cooperate.*

Woman: *As a grandmother, I did not like the way all the kids in the play “drank the Kool-Aid”—is it saying the only way to get something done is through catastrophe?*

Gibson: *We can teach our kids to live more simply, value friends—not things, get involved in the community, feel more a part of the world. Discourage consumerism.*

Rabbi: *We can cut our carbon footprint on food; grow food and learn canning. Promote the idea of the Sabbath as time to spend together without watching TV or playing video games.*

Farmer: *Gibson talked about farmers exploiting the land—what about industrial pollution?*

Gibson apologizes, understands that farmers are just doing their job.

Davies: *It is not expensive to change over to sustainable energy—it would cost just 2% of GDP, half of what we spent on Iraq.*

Survey Responses

There appeared to be at least 100 people in the audience attending the *Scholars Forum*. Some 34 people responded to the portion of the online survey devoted to feedback on ancillary programs, only 9 of whom attended the *Scholars Forum*. The majority of these attendee/respondents said their background in climate science or ecology was “limited.”

The survey asked program attendees to rate the program they attended on a 7-point scale in three categories: “intellectually stimulating,” “esthetically satisfying,” and “scientifically informative.” The *Scholars Forum* was rated 6.22 on “intellectually stimulating” and 6.0 on “scientifically informative” (Figure 7).

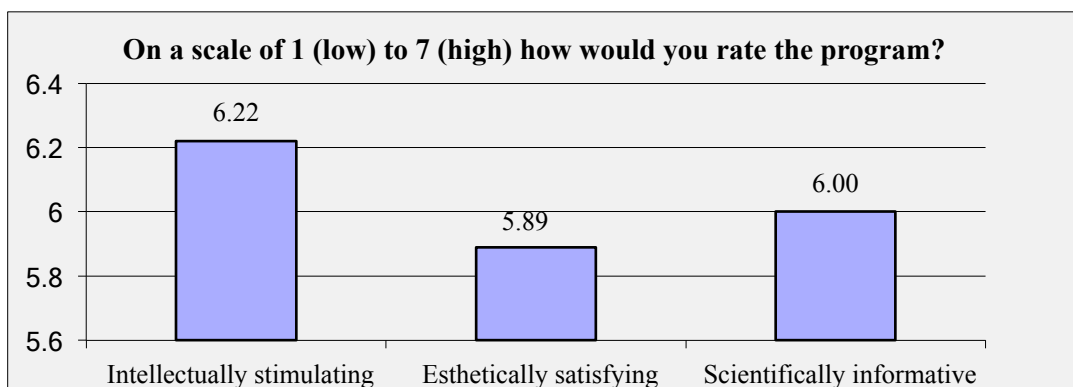


Figure 7. Respondents’ mean ratings of Scholars Forum (N=9)

Scholars Forum attendees’ “new science idea” takeaways from the play were not different from the general audience as a whole. Two attendees learned no “new ideas” but said the play motivated them to try and conserve more. Three other “new science ideas”:

That Earth's population has doubled since JFK. Wow. Other facts but the JFK one really surprised me. ... the disappearance of species brings home the immediacy of the situation. The person I attended with is still convinced that we are experiencing normal patterns of weather.

The magnitude of the Panama Canal's impact on global warning. (Is “warning” a typo or intentional?)

It would be helpful to know what the last statement referred to: does the respondent think the canal has a direct impact on global warming or is s/he referring to the canal traffic’s impact?

Two forum attendees said the play made them feel more motivated to act. Attendees took away more “new ideas” from the program:

Little changes could have made a difference 50 years ago.

[There could be] *alternative irrigation methods for large-scale farms.*

Individuals can do more to make a difference but we need to start now. People need to get over the political issues and take action to care for our environment.

The conversation after the play was very engaging and probably the best of which I have been a part. I hope the professors are seeing young students embrace the idea that this is an issue they need to address now.

Ancillary Program: Interactive Website

Invitations were sent to various people who *The Civilians* and the evaluator thought would provide helpful feedback about the website. Nineteen people responded to the invitation shortly after the website's launch. Since that time science content and videos have been added, and the format tweaked, rendering the responses somewhat obsolete. A follow-up evaluation survey of the website is under consideration.

Users

Respondents' occupations are described in Table 18.

Table 18. Your occupation		
Answer Options	Percent	Count*
Educator	36%	5
Performing artist	36%	5
Museum practitioner	29%	4
Other (Theatrical technician, Physician doing policy work, Biologist, Scientist, Archaeologist, Curriculum specialist)		6

* Count is > than 19 because one person has more than one occupation

The “educator” group comprised of a high school teacher, two college teachers, and two people involved in informal science education. Eight respondents said they were “active in environmental organizations” and eleven said they were “interested but not active.” Similarly, nine characterized their environmental behavior as “very green” and ten said theirs was “green when it’s easy.”

Figure 8. *The Great Immensity* website home page (<http://thegreatimmensity.org/>)

We asked respondents how much time they took to explore the website. Just over half of these virtual visitors spent between 10 and 20 minutes, four spent “less than 10 minutes,” and one person explored “more than 20 to 30 minutes” (Table 19).

Table 19. How long did you spend on the <i>Great Immensity</i> website?		
Answer Options	Percent	Count
Less than 10 minutes	36%	4
10-20 minutes	55%	6
>20 minutes–30 minutes	9%	1

Ratings

We asked respondents to rate the website on a variety of aspects, using a 7-point scale from excellent to very good, above average, average, below average, somewhat poor, and poor. Only nine people responded. Table 20 illustrates the results.

Table 20. Overall, how would you rate the following aspects of <i>The Great Immensity</i> website?								
	Excellent 7	6	5	4	3	2	Poor 1	Rating Average
Design, visual appeal	3	2	1	0	1	1	1	4.89
Ease of use, navigation	1	2	3	0	2	0	1	4.56
Science content	1	4	1	2	1	0	0	5.22
Appeal of "blogger" personalities	1	2	3	3	0	0	0	5.11
Links to relevant sites	0	4	3	1	1	0	0	5.11

Was there too much or not enough science? Only eight respondents answered: one said “too much” and seven said “not enough.” In hindsight, it would have been better to offer a third choice—“about the right amount.”

What did the reviewers think of the science content? Was it interesting, easy to understand and persuasive? The ratings deemed the website strongest on ease of understanding. Scientific content scored slightly lower on interest and persuasiveness (Table 21).

Table 21. What did you think of the science content in the website N=9					
Answer Options	Very much	Some-what	Not much	Not at all	Rating Average
Was the science information interesting?	4	4	1	0	3.33
Was the information easy to understand?	5	4	0	0	3.56
Was the scientific content persuasive?	5	2	2	0	3.33

Was the presentation clear or confusing? Most of the critics found the website too busy and difficult to make sense of it. Five of nine responses said it was confusing and offered the following comments:

Kind of jumbled—a bit too much information all at once.

The design was great, but it was hard for me to get a sense of the "center" of the web page; it felt a bit disjointed.

The website is too confusing with "buttons" all over and no apparent reason to the organization. I could not find an hierarchy and the information seemed duplicated for art and science; I expected more science.

As noted, the screen design is very busy and the overall effect is eclectic. I had to search for a while to decipher what this had to do with theatre, and even then it is not quite clear what the relationship is. There is no sense of priority within the screen design.

It was incredibly difficult to decide what to click on first. The links on either side didn't seem to have a hierarchy, and I couldn't figure out how things were related. The page felt very crowded.

When asked if it was easy to find information that interested them, only two of nine respondents said “yes”—seven said “no.” Three comments that highlight issues and challenges:

Confusing button arrangement.

I couldn't decide what to click on first. I would have navigated away immediately if I weren't evaluating this site on purpose. The clutter was a real turn off, and the information under each link didn't appear to be obviously linked to its heading (at least for the left-hand links).

Wished I could have found a bit more about the play itself.

Three of nine respondents said they followed links to other websites:

Flickr photos. Educational materials.

Don't remember. I was surprised to find myself on another website.

The right-hand column links were more clear and relevant. I visited the Yale, Columbia, and NCEAS websites.

A number of issues were raised around clarity of design and navigation that web designers could address based on these assessments. While there are only a few respondents, all were committed to the assessment and were not chosen at random.

A question concerning affective and cognitive impact drew only nine responses. Figure 8 shows that most of the respondents agreed that the website made them want to learn more about human impact on the planet.

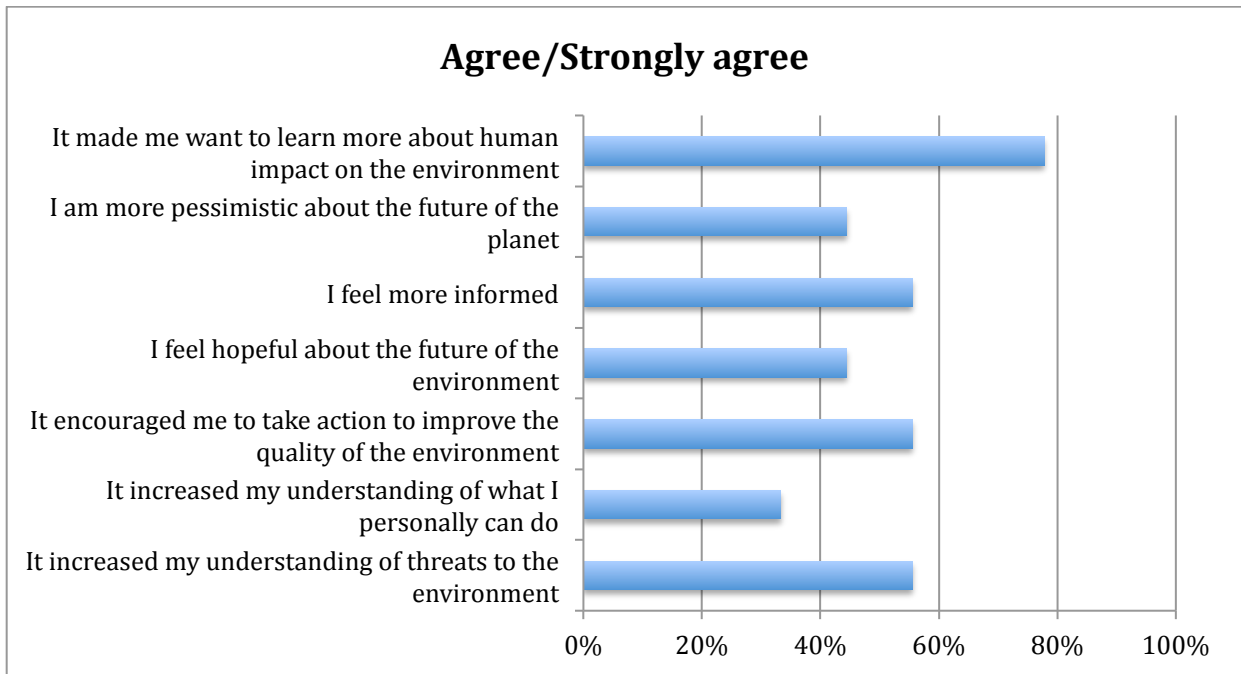


Figure 8. Percent of respondents who agreed or strongly agreed with statements (N-9)

Figure 8 shows that more than half the respondents felt “more informed.” The same number of people came away feeling pessimistic as feeling “hopeful about the future.” While more than half the respondents agreed that the website encouraged them to take action, only about 1 in 3 agreed that it “increased [their] understanding of what [they] personally could do.” *The Great Immensity* performance audiences also wanted to find out more about potential personal actions—a topic that could be enhanced on the website.

Seven respondents wrote about something they saw on the website that they wanted to remember. However, some of the *memories* were more akin to suggestions or critiques than memorable segments.

Critique

I was disappointed in the science; either there is not much or I could not find it.

I read through the main posts. Each was interesting in its own way, but none was especially noteworthy.

Memories

I want to remember the book, "8 Principles for Talking About Climate Change"—I'd love to learn more about the book itself and how it is a solution.

Octopus' Garden...loved the image of what an octopus could find in 8,000 years when much more of the planet is submerged.

*I already knew about mental models, but I *really* enjoyed learning about how to change and update mental models with regards to climate change.*

How seeds are being stored for use in the far future.

The “skeptics” discussion

Was there anything respondents expected but did not see on the website? Of the seven people who responded, four said, “no, it was complete,” and three said “yes.” Five people made suggestions, as follows:

The play

Information on how to get tickets, tour information, or where I can find a recording of the play. I have friends in the Midwest that I know would want to see it, too.

More specifics about Panama, Churchill, and the play. Maybe I missed this.

The topic

More about the causes of global climate change; information that would provide evidence for climate change and information about human role in global climate change; information about natural causes of climate change; the consequences of GCC.

More introductory information. Much of this assumed an existing sophisticated knowledge base.

The website

I had no a priori expectations, however the website design is very eclectic (and visually busy) —I am hard-pressed to cull out some piece of information that I could identify as having priority over some other piece of information.

While *The Great Immensity* website was intended to be a standalone piece, its characters and content are very much related to the play. Users can enjoy the characters on the web, as well as access links to other websites with content about environmental issues. But the website should also function to attract potential performance audiences. Did the website make the viewer want to see *The Great Immensity*? Four people said “Not really,” and five said, “Yes, please let me know where I can see it.”

Most recent website numbers

As of May 20, 2012 *The Great Immensity* website had approximately 3,000 unique visitors and over 7,000 page views. Sixteen new videos (all with original content) were added since the site was inaugurated. We have evidence of 62,800 loads and 2,500 total plays (virtual visitors watched the whole thing from start to finish—through the credits).

FINAL THOUGHTS: ART + SCIENCE = INFORMED COMMUNITIES

The *Framework for Evaluating Impacts of Informal Science Education Projects* suggests six categories for assessing impact:

1. Awareness, knowledge or understanding
2. Engagement or interest
3. Attitude
4. Behavior
5. Skills
6. Other (leaving open the possibility of different impacts)

The Great Immensity aims to engage people through a dramatic, human story so that audience members will respond on a personal level to the ecological crisis at hand. The goal is to draw the audience in—making them *care* about the issues—and to employ *affect* for engagement, thereby leading to cognitive awareness and understanding of the issues.

Findings from observations, surveys, and ancillary programs indicate that *The Great Immensity* succeeds in the first two impact categories. The data in this report indicates that the play *engaged* two widely diverse audiences and increased *understanding* of the topics involved. The play may not have changed many people’s attitude toward what they can do to mitigate the environmental crisis, but many of the students who saw the play said they wanted to learn more about what they personally can do. Respondents from both the student and adult audiences believe that individuals *can* have a positive impact on the environment.

Although responses indicate that people want to do more, we cannot know whether in fact their *behavior* will change over time. Many of the adults said they were already doing all they could, the majority characterizing their behavior as “green when it’s easy” as opposed to “very green.”

An impact in the *other* category might include the audiences’ realization that theater and other arts can have a role in conveying scientific ideas. If audience members did not come to this observation on their own, hopefully the questions on the survey suggested it to them (“I find the connections between climate science and theater/the arts stimulating”). And hopefully the students who had never before seen live theater will be motivated to repeat the experience.

Community members who are not involved in the sciences are often unaware of local—let alone global—environmental issues. It is not always bad news that doesn’t break through citizens’ quotidian lives. An example of the latter occurred in the *Scholars Forum* when Dr. Davies, an activist involved in Kansas City municipal environmental concerns, asked the audience if they were aware of the progressive approach their city is taking toward local problems. None of them were.

Audience response to *The Great Immensity* and its ancillary programs affirms that the arts have an important role to play in raising community consciousness and interest in complex scientific topics. The arts have the potential to reach audiences that science lectures and journals cannot.

APPENDIX 1. ADULT AUDIENCE DEMOGRAPHICS

Table 22. Gender		
Answer Options	Percent	Count
Male	36%	198
Female	64%	348
<i>No response</i>		34

Table 23. Age range?		
Answer Options	Percent	Count
19 years or younger	0%	0
20–29 years	4%	22
30–39 years	5%	26
40–49 years	10%	52
50–59 years	23%	126
60 years and over	59%	318
<i>No response</i>		36

Table 24. What is the highest level of formal education you completed?		
Answer Options	Percent	Count
I am a student	0%	1
High School graduate	1%	7
Some college	10%	52
BA or BS	31%	172
Advanced degree	58%	315
<i>No response</i>		33

Table 25. My background in climate science and/or ecology is: (N=571)		
Answer Options	Percent	Count
Extensive	4%	25
Moderate	41%	234
Limited	55%	312
If “Extensive” please specify:		22

If “Extensive” please specify:

Professional

I have a PhD in science and have read extensively about global warming and its consequences.

I have been an environmental educator for over 15 years

I am co-chair of the KC, MO Environmental Commission

Ph.D. in Physiological Psychology, Post Doc in Animal Behavior, many Na[tional].

Geog[raphic] Tours

35 years of working on environmentally related jobs

I have been working as a consultant in this field for over 25 years.

Masters degree in energy and environmental analysis

I am a scientist

Doctoral work in remote sensing, toxicology, and environmental biology

Life member of the Sierra Club; lead reactivation of local Sierra Club group which had been dormant for many years; on the Kansas Sierra Club executive committee

Member of 20 environmental groups

Thirty-five 35 years in the energy industry

Professor in School of Biological Sciences UMKC

Research Scientist—Microbiologist

Science based careers

Amateur

We've read much the current information available.

Custom builder devoted to energy

I have a bachelor's in biology and chemistry from UMKC

Biology major; traveled and stayed in rainforest and visited Alaska to see the glaciers

Science background, keep up with reports and news

B.A. In biology/conservation

I am very well read in scientific subjects and a long-time supporter of the environment.

Table 26. My background in the arts and/or humanities is: (N=569)		
Answer Options	Percent	Count
Extensive	22%	123
Moderate	63%	357
Limited	16%	89
If "Extensive" please specify:		88

If "Extensive" please specify:

Professional

Theater teacher

Ph.D. in Education, Emphasis on theatre at KU

Degree in theater; 15 years as lighting tech/designer; 20 years in concert production.

Professional writer, editor, and serve on board of a local nonprofit for the arts.

High school technical theatre teacher

Professor of musicology

Taught humanities in college

*BA in Theatre from Washburn, MA from UMKC, worked for the Rep and taught in the Dept.
from 1968–73*

Master's Degree in English Literature; High School and College level teacher

Undergrad and Grad degrees in Theatre

BA in Dance/ taught art & theater classes

Actress

Musician, avid theatre-goer, teach music, and work at Starlight

I'm an actress

Work in the arts. Art history minor in college.

Former English teacher

50+ years professional & personal vocal & piano performance

Professionally produced playwright

I'm a performing artist and teacher.

Professor of Literature

I'm a vocal music teacher and performed quite a bit all through college.

Theatre Professional

Ed. Specialist UMKC alum; musician

I've worked as an artist/illustrator/cartoonist/designer for 30 years

Past chair, Theatre and Film, KU

Professional Stage manager—Arts Administrator for 35 years

professional artist

*Masters in creative writing, teaching, creative management experience, published poet. and
fiction writer*

Arts professional

Patron of the arts

Season ticket holder to numerous production companies

Liberal arts education, extensive “cultural” travel

English major; long-time supporter/attendee of the arts

*Extensive interest in reading; degree in music; performer in local community orchestra and bell
ringer at church.*

Major in college

Librarian

Masters in English, lifelong theater-goer

Masters in Music

I have served on several arts and humanities boards

Season ticket holder circa 20 years Rep, Heartland. Dramatics in college, married to artist, Broadway plays, local theater

Season ticket holder to 4 different venues for a number of years

Recreational, subscribe to Symphony, Rep, Theater League, Opera, Ballet, and advocate for the arts for 30 years. Chair Public Art Program in Leawood.

I attend/enjoy all types of plays/dance/musical performances. My mother was in the classical music business 30+ years. That has afforded me MANY opportunities for all types of performances. I've been a KC Rep season ticket holder for 10+ years.

Season subscribers to KCRep, Lyric, Broadway, Starlight, Chamber and Symphony. Regular 'goers' of Jewish Community, American, and summer stock all around city. And children were involved in music (vocal and instrumental) and theater winning state level awards. Extensive.

Theatre major at Northwestern U[niversity]. Sang with Lyric opera 19 years

I have a B.A. in Religion and an M.A. in Theology

Docent at the Nelson, teacher of English and History, season ticket holder of Symphony and season ticket holder of the Mo. Rep.

Attend local theatre regularly, daughter an actor - attend her Broadway shows, etc. regularly

College degree and 65 years of reading, travel, symphony, opera and ballet

Degrees in Classical Antiquities and English Literature

Well read, book collector, writer

College training in arts, music; currently sing in 3 choirs

Eng[lish] Literature Major, Theatre all through college

I teach upper levels of Spanish, AP and honors and have a masters degree

English/French major w/minor in Art History. go to ALL KC theatres (plays), volunteer at Nelson-Atkins in the galleries

MA in Medieval Studies, BA in Humanistic Studies

Season ticket holder in numerous KC theatres

Theatre goer for over 50 years

Psychiatrist, avocation sculpture

On boards of several arts orgs

Avid theatre/music theatre patron

Been a lover of theatre and arts all my life -grew up in London UK

Post-graduate degrees

theater degree; avid patron of the arts

Undergrad at liberal arts college; MA in German; taught college German, French, English comp

I've done considerable "Community Theatre" and Community Choir singing.

B.A., art

Graduate degree in English; have worked for magazines and written books

Master in English lit

art major, masters in education, museum art teacher

fine arts major

acting in plays age 7 to 17, seeing many plays each year every since.

I'm a professional musician

attend 30–40 events/year, 30% in NYC, SF, LA

English majors, B.A. and M.A.

MA communication and marketing

American Studies major, graduate work in English, avid theatre-goer, season ticket holder for Rep, Symphony, Ballet, Opera, Harriman-Jewell, etc.

MFA in directing from VCU Richmond, VA

I am the associate publisher for KC Studio magazine, the only magazine in KC dedicated to performing, visual and cinematic arts.

Undergraduate degree in Art - some experience in the theater

M.A. Art History

Theatre major in college, BA in English

Music and theater

I have a couple of degrees in the Fine Arts.

Season tickets to multiple cultural events, past president of the Hidden Glen Arts Festival, long time Rep season ticket holder

English major; history of art minor; on boards of arts organizations

Season tickets and attendance at most KC venues for over 25 years

I have a BA in English literature and am well informed regarding art, music and literature.

Advanced degree in Literature/Composition & 35 years teaching & reading it....lifetime attender of theatre. However, compared to many,[my] background is limited.

APPENDIX 2. STUDENT AUDIENCE DEMOGRAPHICS

Table 27. Gender		
Answer Options	Percent	Count
Male	35%	35
Female	65%	64
<i>No response</i>		4

Table 28. Age		
Answer Options	Percent	Count
12	1%	1
13	4%	4
14	3%	3
15	24%	23
16	53%	51
17	10%	10
18	5%	5
Other (please specify)		2
<i>No response</i>		6

“Other” 35 years and 11 years

Table 29. Grade		
Answer Options	Percent	Count
6 th	1%	1
7 th	2%	2
8 th	5%	5
9 th	3%	3
10 th	73%	69
11 th	7%	7
12 th	8%	8
Other (please specify)		2
<i>No response</i>		8

“Other” Teacher, 5th grade

APPENDIX 3. SCHOLARS' BIOGRAPHICAL SKETCHES

Dr. Jane Gibson has a BA with Honors in Anthropology and Environmental Studies as well as an MS from Baylor University, in Waco, Texas and a Ph.D. in Anthropology from the University of Florida in Gainesville. She has taught at the University of Kansas in the Department of Anthropology since 1992 and is current Chair of the department. The work she's done sits at the intersection of people and ecosystems as she continues to ask: *how do people think about and interact with the non-built environment?* Ms. Gibson teaches courses in economic and environmental anthropology. Recent courses include an Introduction to Economic Anthropology, Neoliberalism and Globalization, The Culture of Consumption USA, Cultural Ecology, and Anthropology through Film—a class that focuses on human adaptation. Her main research has included studies of Florida alligator hunters and commercial fishermen, oystermen and shrimpers in Louisiana, Ozark families displaced by the creation of the Ozark National Scenic Riverways, the uses of the rhetoric of sustainability, and the impact of ecotourism development on Costa Rican rural families. Her most current project engages Kansas farmers in a study of land and water use as these relate, among other things, to biofuels and climate change.

Among her honors, in 2001, she received the Robert C. McNetting Prize for Outstanding Paper in the *Journal of Political Ecology*; awarded by the Political Ecology Society (PESO).

Caroline P. Davies is an Associate Professor and Director of the Environmental Studies Program at University of Missouri Kansas City (UMKC). Dr. Davies is a biogeographer whose research focuses on the processes of climate change and human/landscape relationships from a wide range of spatial and temporal scales in the Middle East and the American Midwest. She uses a variety of climate proxies to characterize past and present environments from examining Pleistocene and Holocene climate fluctuations across the Arabian Peninsula, arid land processes, changes in regional hydrology in Jordan, and human modification of the Yemen highlands; to exploring the relationship of airborne particulates and asthma in the modern urban environment. She is also active in the research of science education applications.

Dr. Davies graduated with a Bachelor of Arts in Archeology from William Smith College, New York, completed a Master of Science with the Institute for Quaternary Studies from the University of Maine, and received her PhD in Geography from Arizona State University. From 2006–2007 she was a Senior Research Fellow with the Council of American Overseas Research Centers. Since 2006 she has been the Associate Editor of the *Journal of Geoscience Education*.

A selection of publications by Dr. Caroline P. Davies:

Davies, C. (2007). Past Environments of the Jordan Plateau from the Paleolakes of the Eastern Desert in T.E. Levy, P.M.M. Daviau, R.W. Younker, and M. Shaer (eds.), *Crossing Jordan: North American Contributions to the Archaeology of Jordan*. Equinox, London, 79–86.

Davies, C. (2006). Quaternary Paleohydrology and Past Climates of the Dhamar Highlands, *Yemen Quaternary Research*, 66:454–464.

- Davies, C. (2006). Implementing Earth Systems Science Curriculum: Evaluating the Integration of Urban Environments for an Urban Audience. *Journal of Geoscience Education*, 54:364–373.
- DeMotto, N. & Davies, C. (2006). The relationship between criminal offenses and distance from parks in Kansas City. *Kansas Cartography and Geographic Information Science* 33:141–157.
- Parker, A., Davies, C., & Wilkinson, T. (2006). The Early-Mid Holocene Moist Period in Arabia: Some Recent Evidence from Lacustrine Sequences in Eastern and Southwestern Arabia. *Proceedings of the Seminar for Arabian Studies*, 36:243–255.
- Davies, C. (2005). Quaternary Paleoenvironments and Potential for Human Exploitation of the Jordan Plateau Desert Interior. *Journal of Geoarchaeology*, 20:381–402.
- Davies, C. & Fall, P. L. (2001). Modern pollen precipitation from an elevational transect in Central Jordan and its relationship to vegetation. *Journal of Biogeography*, 28:1195–1210.

Rabbi Moti Rieber has served as Director of Kansas Interfaith Power & Light since March 2011. He is a graduate of the Reconstructionist Rabbinical College in Wyncote, Pennsylvania and previously served in positions in Naperville, Illinois, and Wichita. He is a long-time activist on peace, social justice, and environmental issues, and brings a variety of interfaith and organizational experience to the work of Kansas IPL. He and his wife, Suzy, live with their three children in Overland Park.

The mission of Interfaith Power & Light is to be “faithful stewards of Creation by responding to global warming through the promotion of energy conservation, energy efficiency, and renewable energy. This campaign intends to protect the earth’s ecosystems, safeguard the health of all Creation, and ensure sufficient, sustainable energy for all.” Learn more about IPL at www.interfaithpowerandlight.org.