Abstract

The pandemic changed education in too many ways to describe here. Based upon ACT scores at their lowest in 30 years, and higher levels of student anxiety and mental health issues, it is clear that our students are at risk of falling behind in their age-appropriate knowledge and skills. It can be asserted that one of the areas of casualty inflicted by mandatory home instruction is lack of collaboration, social construction, and focused activity, leading to lower skills and reduced schema due to lack of experience with knowledge building.

This project, a small excerpt from a full dissertation, seeks to explore the new paradigm of education after the pandemic through the lens of part of a case study from 2021-22. Although my particular focus is interest development (Hidi & Renninger, 2006; Renninger & Hidi, 2016), a slice of pandemic life is presented as well to help inform future instruction.

Introduction

I feature three pandemic-era case studies in this excerpt from my larger dissertation study, in which I explore the inter-relationships among the theoretical constructs of interest development (e.g. Hidi & Renninger, 2006), flow (e.g., Shernoff et al, 2014), and Kuhlthau’s Information Search Process (ISP) model (Kuhlthau, 1991) in the context of an in-person Guided Inquiry Design instructional innovation, involving middle grade students in New Jersey. The Framework for K-12 Science Education (2012), an influential and formative document to the NGSS, predicts that interest leads to educational and career choices. The learning objectives include students’ increases in situational and/or individual interest in STEM via participation in assigned inquiry-based SF-related curriculum and activities. The inquiry learning environment, specifically GID, coupled with the SF content focus, has potential to cultivate interest development due to its recognition and fostering of the Affective domain, where interest resides. It is my conjecture that SF is a particularly engaging instructional design feature and the addition of SF is the main “innovation” I add in my study that offers a new contribution to the literature. Other primary innovations, to which the research questions below are mapped, are the effects of an information literacy component on situational and individual interest, and the synthesis of the theories of Flow, interest development, Kuhlthau’s ISP, and social constructivism as viewed within the use of Guided Inquiry and the incorporation of the GID in an online learning environment.

Overall, this study contributes to the continuing development of links and associations between the arc of the GID and the arcs of the interest development process and the Flow experience. Their similarities and parallels indicate that they should be used in tandem when
designing STEM curriculum, particularly in conjunction with the highly popular SF stories and series with which the students are often familiar and comfortable. Their use provides a platform upon which to build curricula that stimulates young scientists even in an emergency remote teaching (ERT) environment. The primary research questions this dissertation excerpt will address are:

1. SFF. In what ways(s) does student progression through a multi-session learning intervention based on Kuhlthau et al’s guided inquiry design (GID) instructional theory, adding in a component on Science Fiction and Fantasy texts, contribute to students’ situational and individual interest development in STEM subjects covered in those texts?

2. Integrated model. In what ways does student progression through a multi-session learning intervention based on Kuhlthau et al’s guided inquiry design (GID) instructional theory, reveal inter-relationships among the theoretical constructs of interest development (e.g. Hidi & Renninger, 2006), flow (e.g., Shernoff et al, 2014), and the ISP (e.g. Kuhlthau, et al., 2012)?

Methods

Pandemic-era Teaching in New Jersey. Executive orders issued by New Jersey Governor Phil Murphy, effective on March 18, 2020, in conjunction with the actions of many other governors, mandated remote instruction for all K-12 public, private, and parochial schools (Reynolds, Aromi, McGowan, & Paris, 2022). While public schools were required to provide to the state “. . . ERT transition guidelines, including prompts for instructional technology integration and plans for securing digital equity” (Reynolds, et al., 2022, p. 7), private schools like the Jewish after-school religious program in which this study was conducted were subject to less official guidance. Educational Director Rabbi NM was both blessed and cursed by this low level of oversight. She could make her own decisions about how to proceed technologically, e.g. choices of online program, curricula, overall vision. However, she did not have a strong pool of employees and administrators with whom to make and guide those decisions. The result is that students and parents experienced uneven instruction that improved as the pandemic wore on. Fifth-grade student Rachel (no real names are used per IRB) confirmed this pattern: “Um, I think the pandemic, like kind of, like ruined my experience here, because like, last year, it was like, really bad. I hated being remote and stuff. But like, this year, it's not as bad because like, I've good teachers, and like, they're kind of like making it fun and stuff. So last year was definitely really bad. But this year is not so bad” (Rachel, Pandemic Learning Code). Student Greg described the progression in quality of instruction in the pragmatic way he often approaches problems: “Because it's like, because you like, you can hear like the teacher like way better without the mask.”

Instruction delivery changed from the Pilot study, conducted the previous year at the same site, to the second iteration of the study, beginning in early September, 2021. Classes were conducted in-person but with many restrictions listed in Table 1 (below).

Table 1.

<table>
<thead>
<tr>
<th>Limitation Imposed upon Student Activity</th>
<th>Impact upon Instruction and Learning</th>
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<table>
<thead>
<tr>
<th>Limitation Imposed upon Student Activity</th>
<th>Impact upon Instruction and Learning</th>
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</thead>
</table>

98
Mandatory masking | As Greg points out above, students (and instructors) can hear better without masks. As a result, instruction was impeded by many interruptions because students did not understand me or each other during reading and discussion.

Outdoor instruction whenever possible | Ten minutes of instruction were lost during each lesson that was held outside. Additionally, distractions such as the weather, traffic, and other student groups close-by played a factor in how students responded to outside as a learning space. Finally, I could not record classes outside.

Windows and doors open at all times | This was only a distraction if the weather was cold or the class was too loud due to an activity. Also, I have a loud, strong voice that carries outside of the room if the door is open.

No sharing of materials, such as textbooks, notebooks, and writing supplies | This policy made it extremely difficult to plan group activities involving physical or digital artifacts since such things are routinely shared.

No mingling of classes or full group meetings | This did not impact the STEAM Academy class.

Limited use of bathrooms and water fountains | This was an inconvenience but it did not affect learning in any discernible way.

No student traveling from classroom to classroom | This was an inconvenience but it did not affect learning in any discernible way.

Limited use of video recording | This was a problem when the ability to record was removed without previous knowledge. I often had to make a quick lesson adjustment when told at the last minute that class must be held outside.

Case Study and Thick Description. Observing students over a period of time, in this case five months, produces a potential narrative that can be used to focus on a learning process closely over time (DeWalt & DeWalt, 2011). Geertz (2017) popularized the term “thick description” to describe the intimate details, perceptions, and perspectives collected and analyzed during case study. There is a tradition of thick description in science fiction. Ursula LeGuin is a prime example of an author who successfully builds new worlds and historicities employing ethnographic methods reminiscent of Geertz (Davison-Veccchione & Seeger, 2021). LeGuin’s worlds explore socio-sexual potentials, political possibilities, and ethical anthropologies; these explorations require the type of rich, detailed, sensual descriptions employed in this case study. LeGuin’s intensely-drawn characters and worlds paint a rich portrait of an alternate Universe of possibilities, and the goal is to bring that sense of wonder and possibility to the curriculum.
Case Study and Contextuality. This project is profoundly affected by the pandemic, and the content, delivery, and available data are all affected by this unavoidable situation. However, this is an excellent time to incorporate the idea of contextuality into the case studies’ formation (Mabry, 2008). How was the content of the project affected by the pandemic? What would have gone differently if not for the pandemic? How were the topics we discussed affected by the pandemic? Were the natures of the artifacts affected by the pandemic? Case studies demonstrate a wide respect for the complexity of life (Mabry, 2008). Many slices of life are needed to construct a picture of an experience, and case studies are one method within which to offer those finely-detailed portraits.

Design-Based Research as Methodology. Design-based research (DBR) has informed this project well, providing both a methodology and a method (Barab, 2014). Design-based research’s (DBR) goals are to dynamically reflect and adapt during research and intervention (Barab, 2014). DBR also supports observing naturalistic settings and integrating theory and practice through a cycle of reflection and iteration (Barab, 2014; Glaser & Strauss, 2017). Those naturalistic settings, students in a STEM classroom, school library, and/or school research/writing lab, are collaborative and active, and should remain iterative until the end of the intervention (and possibly beyond). Fortunately, a common result of DBR is the ability to conduct an assessment of whether it and the other theories/methods that comprise the study’s design were effective (Barab, 2014). This valuable information will be used to make decisions concerning future iterations in the study.

The Students. The n of the class started at 10 and ended at 12; after adjusting the IRB, the 2 additional students were allowed in by their request. All students and parents signed consent forms and the Educational Director Rabbi NM was very supportive of the study. From the 12 students, I selected 3 who represented different slices of learning style, attitude, personality, and self-efficacy. However, I must concede that all 3 of the selected students produced artifacts and experiences in class on a regular basis, thereby providing more data and richness to the case studies. The 3 students selected for additional study are listed below (Table 2)

Table 2

<table>
<thead>
<tr>
<th>Student Pseudonym</th>
<th>Gender and Ethnicity</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greg</td>
<td>Male, White, Jewish</td>
<td>Greg is full of energy and he stays focused if others do not distract him. Greg likes to do well and receive acknowledgment. He also enjoys being proud of what he does. Other teachers reported to me that he was a behavior problem, but all he wants is respect and a little space to be fidgety.</td>
</tr>
<tr>
<td>Rebekah</td>
<td>Female, White, Jewish</td>
<td>Rebekah is a very assertive person. She knows what she likes and likes what she knows. Her final project eclipsed all others in that she created an actual working robot while everyone else created imagined artifacts.</td>
</tr>
</tbody>
</table>
Mindy Female, White, Jewish

Mindy likes working with others. She claims to like fantasy. Interested in creating things. Creation seemed most important to her. Her interest in Science has increased due to this class.

Results

Approach to the Data. The data sources from which the following vignettes are taken, a compact version of a larger dissertation project, are student pre-interviews, activities during the 9 classes conducted, artifacts produced during the 9 classes, and post-interviews. The goals of the use of each data source are featured in Table 3 (below). The case study data will be presented in the order of Table 3. Due to the space limitations here, one of the three students, Greg, will be featured. The others, along with Greg, will be fully presented in the dissertation.

Table 3.

Goals of the Use of Each Data Source.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Format</th>
<th>Goals of the Use of this Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Interview</td>
<td>Transcribed and filmed interview before the intervention</td>
<td>The Pre-interview is an important tool to become assimilated into the culture of the students. Learning about the students’ interests, likes and dislikes, and general attitude towards STEM and science fiction, informs the design-based research process and the considerations involved in adapting instruction.</td>
</tr>
<tr>
<td>Class Activities</td>
<td>Videographed and transcribed using Otter AI.</td>
<td>Capturing of class activities will be used to chronicle development of the students’ interests through comments, collaborations, and experiments and activities related to them. Captured single frames from 45-to-50 minute videos are the data that will be used to demonstrate student learning and interest development.</td>
</tr>
<tr>
<td>Student-created Artifacts</td>
<td>Experiments, Research Materials, and Final Projects</td>
<td>Artifacts are the only truly physical evidence of student activity. They greatly inform instructors’ instructional design for future iterations. In many learning environments, “. . . analysis of an artifact be carried out as a means to interrogate the intentions and actions of the designer(s) creating the artifact” (Boling &amp; Gray, 2020, p. 94). That is the purpose of case study, making artifact analysis a key component of the data set.</td>
</tr>
<tr>
<td>Post-interview</td>
<td>Transcribed and filmed interview after the intervention</td>
<td>Interviews can provide a wealth of knowledge about not only students but also their experiences, skill sets, and approaches to problem solving, especially in STEM learning (Civil, 2014). The post-interview is one of the primary data sources that demonstrates changes in interest and the efficacy of the new theoretical model. It also informs changes in the model using DBR as a guide.</td>
</tr>
</tbody>
</table>
Case Study: Greg. In his pre-interview, Greg indicated, “I like a lot of, like, Science projects.” Like many students in the class, Greg chose to read on his own the stories “A Gun for Dinosaur” by L. Sprague deCamp and “Cookie Cutter Superhero” by Tansy Rayner Roberts. He explained that “Um, so I like superheroes and stuff. And I'm really interested in animals.” Moreover, he states that, “I like studying like the planets and like the solar system.” This data suggests to me that Greg is open to both science fiction and to STEM learning. Superheroes are already fantasy or science fiction, depending upon the specific Universe in which they exist: A futuristic Batman-like superhero could be science fiction, since Batman does not have any supernatural powers, but in any era or Universe, Superman or Green Lantern (for example) will always be fantasy due to their supernatural abilities. Greg’s interest in being a veterinarian and his fondness for animals, which he states several times during the pre-interview, mean that Caleb is beginning the class above the first phase of interest development (see Figure 1 below). Based upon Hidi & Renninger’s 2006 model, Greg is in Phase 2 or Phase 3, which should make him quite receptive to the class (Renninger & Hidi, 2016; Hidi & Renninger, 2006). The following give-and-take highlights Greg’s desire to collaborate and experiment in-person, mask-free, something he missed greatly during the Pandemic and that he is excited to do in this class:

Greg: So, I think that learning is a lot harder [during the pandemic]. Because it's like, because you like, you can hear like the teacher like way better without the mask.

B. DuBoff: No kidding!

Greg: You can do more partner work with like your friends, and they can help you understand stuff better.

B. DuBoff: I agree. And then how about specifically science subjects?

Greg: Um, I think that it affected learning about science by like because people like can't be close to each other trying to figure out something together, because most things are figured out with a group of people.

Without realizing it, Greg argues in favor of social constructivism and laments that he cannot do more of it.

Figure 1.

*Four Phases of Interest Development (Hidi & Renninger, 2006).*
Greg: Class activities. Greg excelled during kinesthetic, physical experiments. Although other teachers complained that Greg was too “hyper,” I was informed by his pre-interview and his stated desire to work with others in-person, so I knew before the class began that including more team-based, STEM experiments requiring collaboration, creativity, and problem solving, and additionally creating the potential for Flow (Csikszentmihalyi, 2008).

Ecology and humanitarian themes emerged early in the program, and many students expressed an interest in and wondered about themes such as fossil fuel versus solar power, caring for sick and needy people and animals, and cleaning up the environment. Caleb began the exploration of these topics in class one when he asked, “What would happen if oil slowed down?” That is the exact theme of the excerpted book Empty by Suzanne Weyn that we had just read aloud. He also asks, “If we ran out of oil, would everyone drive a Tesla? . . . Couldn't we have a solar panel car?” Greg is often the first to dive into a topic and ask questions, especially if he feels as if he has a little expertise or can make an entertaining, clever comment. He is naturally outgoing and gregarious except if he feels overwhelmed or has reached cognitive load, when he can suddenly turn sullen and detached.

Greg's need for movement is obvious. During Class Three, I became aware that he was organizing and re-organizing something at his desk, just so he could be moving somehow. He is also slumped in his chair; listening is not his strongest skill. At 8:00, during discussion and modeling of the K-W-L as a a charting tool, Greg was facing the other way and playing with

<table>
<thead>
<tr>
<th>Less-Developed (Earlier)</th>
<th>More-Developed (Later)</th>
</tr>
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<tbody>
<tr>
<td><strong>Phase 1:</strong> Triggered Situational Interest</td>
<td><strong>Phase 2:</strong> Maintained Situational Interest</td>
</tr>
<tr>
<td><strong>Definition</strong></td>
<td></td>
</tr>
<tr>
<td>Psychological state resulting from short-term changes in cognitive and affective processing associated with a particular class of content</td>
<td>Psychological state that involves focused attention to a particular class of content that reoccurs and/or persists over time</td>
</tr>
<tr>
<td><strong>Learner Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>- Attends to content, if only fleetingly</td>
<td>- Reengages content that previously triggered attention</td>
</tr>
<tr>
<td>- May or may not be reflectively aware of the experience</td>
<td>- Is developing knowledge of the content</td>
</tr>
<tr>
<td>- May need support to engage from others and through instructional design</td>
<td>- Is likely to have positive feelings</td>
</tr>
</tbody>
</table>
something manually. He had trouble staying focused on the lesson, but from previous experience, I know that Greg is clever enough to retain part of what was said so he will not look foolish if approached or asked. Later in the class, during brainstorming for a cluster map about potential topics for exploration, Greg makes a great point about what other spokes could go in our cluster about eliminating oil and gas use, right out of Back to the Future: "I don't know if this answers the question, but one of the material sources could be trash, since there's so much trash on the earth and we could use trash for everything, instead of oil and gas." His friend Rebekah cynically asks, "So how are you going to fill your car [tank] with trash?" However, Greg follows up with a comment about collecting trash, and that sparks the class to design their projects around cleaning and helping the environment for their tikkun olam (heal or save the world) projects.

Greg: Artifacts. Greg’s proudest moment during the 9-class unit occurred during the “paper rocket” exercise. Student teams are given paper, masking tape, and a plastic straw and asked to create a rocket from the paper and tape and propel the rocket with the straw. Each team gets 3 launches, and each is measured in inches and recorded as data. This is a valuable research and experiment experience, especially for fifth-graders who had not been together for two years due to the Pandemic. Greg’s team, Team 1, designed the best rocket and propelled it the farthest. He was very proud of this accomplishment and was happy to record and make a chart with the data that showed his team winning (see Figure 2 below).

Figure 2.

Rocket Flight Data for Experiment.

<table>
<thead>
<tr>
<th>Rocket Flight Data</th>
<th>Team 1</th>
<th>Team 2</th>
<th>Team 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight 1</td>
<td>44</td>
<td>55</td>
<td>42</td>
</tr>
<tr>
<td>Flight 2</td>
<td>109</td>
<td>19</td>
<td>72</td>
</tr>
<tr>
<td>Flight 3</td>
<td>67</td>
<td>62</td>
<td>19</td>
</tr>
</tbody>
</table>

Greg is at his best while moving and performing, so this experiment was ideal for him. The action shot of Greg and Rebekah creating and launching the rocket show the focus and concentration Greg can attain when appropriately engaged (see Figure 3 below; Rebekah is left, Greg is right, the rocket is circled in red).

Figure 3.

Greg Launches his Team’s Rocket.
The other major artifact Greg produced with Rebekah was the emo 2000, a trash-collecting robot. Although Rebekah admitted that the working robot was created “with a little help from her Dad” the engineer, Greg worked on the “front” of the robot, created with foamboard, corrugated boxes, and many artistic supplies and chachkes such as crayons, markers, glitter, stickers, and other objects created from corrugated cardboard (see Figure 4 below).

Figure 4.
*The emo 2000 Trash-Collecting Robot in Operation and on Foamboard.*
Greg: Post-interview. In all interviews, both pre- and post-, I gave parents the option to sit in on the interview as a passive participant. Although most students appeared alone, 3 of the 12 students’ mothers sat in. Greg’s mother sat in during both interviews. My approach is to achieve the maximum amount of comfort for the interviewee and his/her family so I can get the most relaxed, easygoing interview possible. Parents generally respect the lines they should not cross to achieve genuine authentic, student-generated data, but sometimes a parent is helpful to make a fifth-grader more comfortable speaking to an adult in what some students may consider to be a high-pressure situation. It was clear to me throughout his interviews that his mother’s presence was a benefit, not a problem, as she gently prodded Greg when he had trouble answering but did not plant any ideas.

In his post-interview, right out of the gate, less than a minute into the interview, Greg wanted to demonstrate his pride to his Mom over the rocket experiment and his collaboration with Rebekah on the emo 2000:

Greg: So we did this project, when you make a rocket out of paper?

Greg's Mom: Uh huh.

Greg: And see if it which one would fly the farthest. And mine did.

Greg's Mom: Oh, awesome.

B. DuBoff: I mean, it was really a superior design, I must say. Let's talk. Alright, so what did you like best about the class? And what interested you the most?

Greg: What interests me the most is probably like, making and come up coming up with a, like the robots and stuff. And I like best of all the class was working with my partner to make the design for the robot [the emo 2000].

This expressed interest in robots did not appear in Greg’s pre-interview, except possibly his interest in superheroes. He spoke frequently about wanting to be a veterinarian and stated that he likes animals a great deal, but he did not address technology. In fact, the words “robot” and “design” do not appear in the pre-interview, but are first out of the chute in his post-interview. This demonstrates a change in his attitude and approach. The project has created a new interest for Greg. He is still in the beginning of his interest in technology and robots, and it may fade in time if not reinforced frequently, but for Greg in this place, at this time, a new potential career STEM interest has sprouted. If properly nourished, it will grow into one of the 3 or 4 main interests people normally have at one time (Renninger & Hidi, 2016).

The rest of Greg’s post-interview was highlighted by his discussion of astronomy, the planets, and the solar system, another new interest. Coincidentally, and fortunately for Greg, I had changed my bulletin board halfway through the unit to the planets and solar system. Without data to propose it, I can only surmise that it aided Greg in developing his interest through frequent exposure. However, the following excerpt does demonstrate the effect of activating students’ schema:

Greg: So, me and Lea were like, Lea and I were thinking about how we're thinking of a project that could help people in need. So we came up with a
portable trash can that can, like pick up trash for people, and help people like who
they can't walk as well as other people. And they can like, I can, like pick up the
trash, move it around. So that's like, so their home is like not a mess.

B. DuBoff: And what made you think of that? Was it anything in our discussion
or conversation that kind of got you the, you know, gave you the idea?

Greg: So mainly, the conversation, like we heard it, like, once, and we thought it
was a good idea. So that's why we chose it.

Just hearing about something can be the hook that begins interest (Renninger & Hidi, 2016). An
intentional or casual thought can become a great invention, innovation, or career.

Finally, Greg seemed positively influenced by the science fiction as predicted by the
theoretical model that accompanies the full dissertation: “I like the part where it was talking
about how there was an old book found in there in the shelf, because they never like it because it
was in the future. And they had books on like, electronics.” The story we read was “The Fun
they Had” by Isaac Asimov. Then he recalls another excerpt, this one from Empty by Suzanne
Weyn: “Um, your talking about the pipes that would clean the water and filter them. So that
wouldn't be like having trash in it. That seems cool, because it would start it would like stop
pollution in the water.” This comment is in response to a class discussion about global water
shortages and the “purple pipe” system that many countries and areas of the U.S. use to conserve
potable water and energy. When Greg remembers these issues and scaffolds this information
onto existing schema, interest can begin (Reiser & Tabak, 2014). Greg appears to be well on the
way to interest in STEM careers and, to a lesser degree, in science fiction.

Conclusion

This small excerpt of a dissertation project demonstrates, through presentation of
qualitative data refined through Design-based Research (Barab, 2014), change and enhancement
of interest in one case study participant. Greg’s activities and comments also indicate that
science fiction can be a successful hook to capture, and potentially hold, student interest. Also,
Greg’s shift to new STEM interests by the end of the class suggests that a student already
interested in STEM careers and activities may be as likely or more likely to be open to new
STEM careers and activities. The full dissertation will present more evidence and more students,
the three originally discussed in the beginning.

Although I cannot claim the evidence can be applied universally with such a limited
viewpoint, I do believe that Greg is representative of many 10-year-old American boys,
particularly living in the Northeast U.S., and that his experience can be seen as one more block
of data supporting the use of science fiction and kinesthetic activities in STEM interest
development. According to the findings, fifth-graders do better when they can do more.
References


Appendix A: Pre-Intervention Interview Questions

These interviews will be in the Constructionist style (Brinkmann & Kvale, 2015). It is acknowledged that the interview process contextually affects the interview.

Pre-intervention

1. Tell me about your interest in SFF and STEM? (interest development)

2. Why did you choose your story or stories? What about it interested you? How did the cover and first couple of pages interest you? (general literacy and interest development)

3. What do you like or dislike about Science class in regular school? What are your favorite topics in Science? What makes you interested in those topics and not other topics? (Science literacy)

4. Are there Science topics you like more than others? If so, which ones? What makes them interesting to you? (Science interest)

5. If you could pick a Science-related job, what would it be and why? (Science interest)

6. Do you ever think about the future, both your future and the world’s future? What do you imagine will be different about the future from now? (Science interest)

7. Tell me about the most interesting ways that Science or scientific things have changed the world. (Science interest)

8. What world problem would you solve if you had the power to do anything? (cite some examples so they know what I mean, like global climate change, cancer cure, feed the hungry, etc.). (Science literacy)

9. Do you think that after this class you will be better at Science or English? Why or why not? (Science literacy and general literacy)

10. Do you think this class will make you a better researcher? How? (information literacy)

11. What are your expectations for the class? What do you think we’ll do? Do you think it will be interesting even though you do not know exactly what will happen? (general interest)

12. Does reading and thinking about the future help you with your projects at school? Please describe one. (information literacy)

13. Where do you normally research for your school projects? (information literacy)

14. Do you like learning about new words and phrases in Science or other subjects? (Science and information literacy)

15. Any questions or comments?
Appendix B: Post-Intervention Interview Questions

These interviews will be in the Constructionist style (Brinkmann & Kvale, 2015). It is acknowledged that the interview process contextually affects the interview.

Post-intervention

1. What originally interested you about Science Fiction and Fantasy and Judaism? What do you think has caused your interest to increase or decrease in STEM, SFF, or Judaism during the class? (interest development)

2. Why did you choose your book? What about it interested you? Did you learn any new words or concepts from the book? (general literacy)

3. What do you like or dislike about Science class in regular school? What are your favorite topics in Science? What makes you interested in those topics and not other topics? (Science literacy)

4. Are there Science topics you like now that you did not like or know about before? If so, which ones? What makes them interesting to you? (Science interest)

5. If you could pick a Science-related job, what would it be and why? (Science interest)

6. Do you ever think about the future, both your future and the world’s future? What do you imagine will be different about the future from now? (Science interest)

7. Tell me about the most interesting ways that Science or scientific things have changed the world. (Science interest)

8. What world problem would you solve if you had the power to do anything? (cite some examples so they know what I mean, like global climate change, cancer cure, feed the hungry, etc.). (Science literacy)

9. Do you think that after this class you will be better at Science or English? Why or why not? (Science literacy and general literacy)

10. Has this class made you a better researcher? How? (information literacy)

11. What about the class has been fun and interesting? Please describe. Was anything boring about the class? Please describe. (general interest)

12. Tell me about your project. How did reading and thinking about Science Fiction and Fantasy (SFF) help you with your project? (information literacy)

13. How did the resources of the class like the websites, videos, etc. help you to research your project? (information literacy)

14. Please talk about some of the new words and vocabulary you have learned. What are some of the most interesting words and definitions? What makes them interesting? (Science and information literacy)

15. You probably had an idea of the types of things you would learn and do in this class. How did they match up with what really happened? How was it better, worse, or about the same as you expected? (interest development)
16. How would you describe the class to a new student who had never heard of it? Would you recommend it? (interest development)

17. Any final comments or observations?