

HILLMAN HALL OF MINERALS AND GEMS

CARNEGIE MUSEUM OF NATURAL HISTORY

ANUJA PARIKH

UPCLOSE

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HILLMAN HALL OF MINERALS AND GEMS

REPORT ON INTERVIEW FINDINGS

EXECUTIVE SUMMARY

In preparation for the redesign of the Hillman Hall of Minerals and Gems, the University of Pittsburgh Center for Learning in Out-of-School Environments conducted interviews with 130 visitors who came to the hall in 62 distinct groups from December 2005 to January 2006. Findings suggest:

- Visitors generally reported favorable impressions of the current Hillman Hall of Minerals and Gems. Most of these favorable impressions appear to revolve around an aesthetic appreciation of the hall. Visitors often talked about the beauty of the minerals and the visual display of the hall. Words such as “pretty” and “colorful” were consistently found throughout many of the visitors' interviews, and more “unattractive” objects such as coal were ignored or talked about negatively.
- Visitation times in the hall were generally high. Adult groups spent an average of 25 minutes, ranging from five to 60 minutes. Families spent an average of 17 minutes, ranging from five minutes to 120 minutes. Visitors who were already knowledgeable about gems and minerals stayed in the hall longer than those who were novices. Families with younger children spent less time than families with older children.
- Two-thirds of adults and families reported that they did not know much about Minerals and Gems. Most of these visitors expressed an interest in learning more, especially about the scientific information, the process or history of how the minerals were found, and how they are used in everyday life. Families were particularly likely to come to the hall with educational as opposed to or in addition to aesthetic goals.
- Although visitors appreciated the look and layout of the current hall, most visitors thought their visit would have been enriched by access to better information and more context in the hall. Visitor often mentioned that the current signage was difficult to read and too technical or that signage was missing from certain exhibits that needed more explanation. Visitors also reported that the hall was more effective as a learning environment for older children (middle-school and up) than younger children.
- The three favorite exhibits for visitors were the Fluorescence and Phosphorescence Exhibit for its interactive display, the Systematic Collection for its beauty, variety, and uniqueness in the display and the minerals, and the birthstones and precious gems for their beauty and aesthetic value.

INTERVIEW METHODS

From December 2005 to January 2006, researchers interviewed 31 adult groups and 31 family groups. An adult group typically consisted of a single adult or a pair of adults who had experienced the hall together. Of the 47 adults, 21 were female and 26 were male. All but one of the family groups consisted of a single adult who was visiting with at least one child 12 or younger. Of the 32 adults, 16 were female and 16 were male. Of the 51 children, 29 were female and 22 were male.

Visitors were recruited at the entrance of the Hillman Hall of Minerals and Gems. We approached visitors as they were exiting the hall and asked them if they would mind participating in a short interview about their experience in the hall. There were twenty refusals, mostly due to time constraints or personal reasons. If we were granted their permission, interviews were digitally recorded with a small audio recorder.

Both the adult and family interviews contained twenty questions (see Appendix A and B). The adult interviews focused more on the hall's content and their perceptions of what different parts of the exhibit meant to them, while the family interviews focused more on the visitor as a parent¹, and the experiences that they and their children had while inside the hall. Interview questions were designed to address staff questions on visitor learning in the hall. Questions were developed based on our past work with similar projects as well as from materials provided to us by the education department at the museum. The adult interviews took on average 4 to 7 minutes (mean = 5 min, 38 sec) while the family interviews were a little shorter, averaging 3 to 5 minutes (mean = 4 min, 11 sec).

FINDINGS

WHY DID VISITORS COME TO THE HALL?

Visitors came to see the hall for a multitude of reasons. One-third of adult visitors (10 adults) and almost half of the family visitors (14 families) came to the Hillman Hall of Minerals and Gems because they enjoyed the contents of the hall.

Of these set of visitors, similar numbers of adults and families mentioned coming to specifically see the hall or that it was a favorite exhibit (7 families, 8 adults). More families also mentioned stopping in because of a general interest in minerals and gems (5 families), while adults mostly talked more about coming to the hall to enjoy the aesthetics aspects (5 adults, 2 families).

- It was my decision. I, we've never been to this exhibit, but I had gone to the New York Museum of Natural History Gem and Minerals exhibit. That's like my favorite in the museum, so I just wanted to see this one. (Adult #9)
- That's like their favorite part. They love seeing the gems. (Family #7)
- I just like it when I come here. It's pretty and Melanie likes it, my daughter who's five. She likes it for the, just basically to look at all the aesthetics of it. (Family #2)

¹ For ease of reading, all adults interviewed in the family interviews, including grandparents and legal guardians, will be regarded to as parents in the rest of this paper.

A few families came with an educational goal in mind.

- We brought our grandson who we thought it would be a good activity for him today. He liked the minerals and gems. He has a rock collection. (Family #20)
- It was her pap's choice. Her parents gave her the gem book for Christmas, and I said, let's go learn a little more. (Family #30)

Other visitors came to see the hall as a part of the museum experience (8 adults, 6 families) or because they stopped by after going to see another specific exhibit (5 adults, 5 families).

- I actually came to see the Christmas Trees, and because I had to pay ten dollars at the door, I thought, I may as well stick around. (Adult #1)
- The kids, it was really arbitrary. The kids usually like to see the dinosaurs and it's next to the dinosaur facility. (Family #26)

A smaller number of visitors came to the hall to pass the time (3 adults, 1 family), or because the hall was in the entrance to the museum (2 adults, 2 families).

- It looked interesting and it was located right in the entrance. The first thing I saw, so thought I'd start here. (Adult #12)
- My friends are in the other room and I'm bored with what they're doing, so I came in here. (Adult #24)

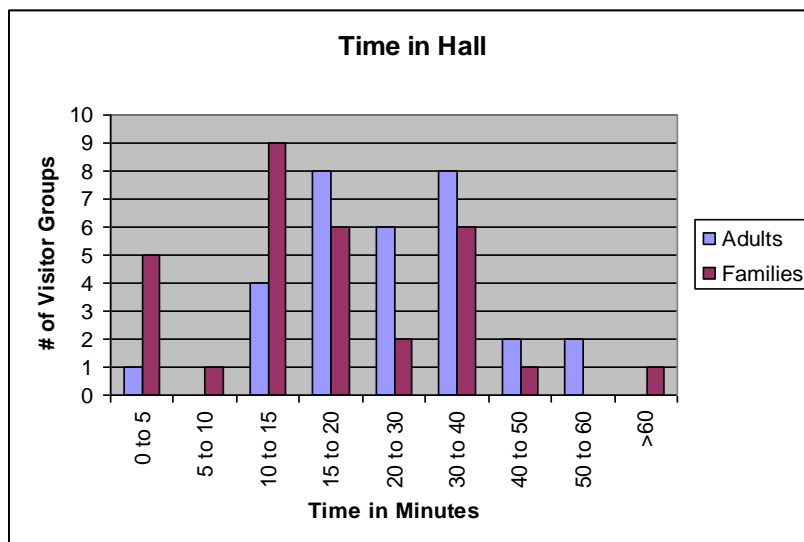
HOW LONG DID VISITORS SPEND IN THE HALL?

Though many visitors did not specially come to see the Hillman Hall of Minerals and Gems, everyone who went through the hall ended up spending a long time inside. With the exception of one visitor, adults spent at least 10 minutes in the hall, and the majority (22 adults) stayed inside the hall for 15 to 40 minutes. The mean time spent in the hall was around 25 minutes.

Some families also spent a lot of time in the hall. With the 2-hour outlier removed, the mean time spent in the hall was around 17 minutes. Most families spent 10 to 40 minutes in the hall.²

²For a more accurate representation, the rest of the data in this section has been averaged without Family #30, who spent 2 hours in the hall.

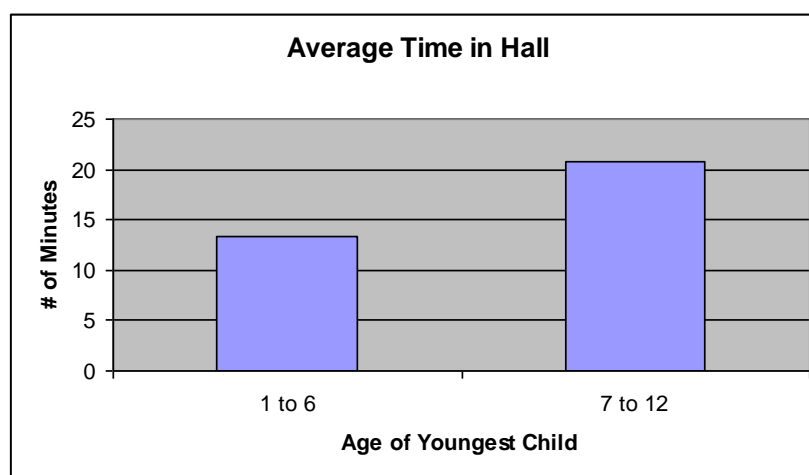
Table 1. Time in Hall



It is interesting to note that adults on average are spending almost 10 more minutes in the hall than families. In fact, after 20 minutes, two-thirds of families (67%, 21 families) of families left while almost 60% of adults (18 adults) still remained in the hall for up to another 20 to 60 minutes.

One reason may be due to age. On average, families whose youngest children were between the ages of 1 to 6, ended up spending a mean time of 13 minutes in the hall, while those who had children ages 7 to 12 spent a substantially longer time in the hall, averaging 21 minutes.

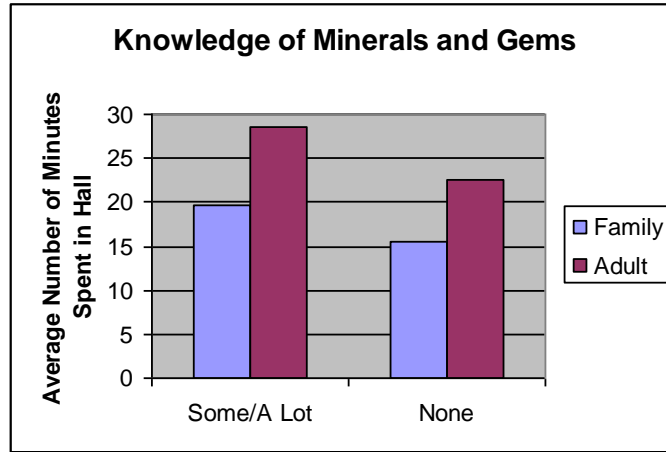
Table 2. Average Time in Hall



Another reason may be due to interest. On average, both adults and families who reported that knew a lot about gems and minerals spent about 5 minutes longer in the hall than those who knew nothing about gems and minerals. On average, adults who mentioned that they knew some or a lot spent 29 minutes in the hall, while adults who mentioned that they knew nothing about gems and minerals spent 23 minutes in the hall. Similarly, families who felt that they knew some information

about gems and minerals spent on average 20 minutes in the hall, while families who felt that they didn't have any knowledge spent 15 minutes.

Table 3. Knowledge of Minerals and Gems

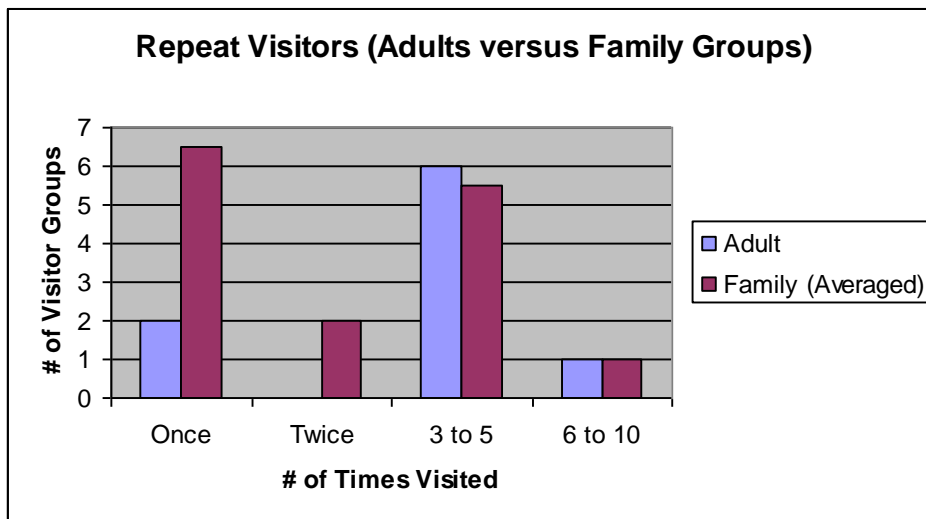


WHO ARE THE VISITORS IN RELATION TO THE HALL?

All interviewees were asked if they had been to the Hillman Hall of Minerals and Gems before. For adults, slightly less than two-thirds of the visitors were new to the hall. 19 adults stated that they had not been to the hall, while 12 adults stated yes, they had been to the hall before. What was surprising with the adult visitors was that those who do return, come back to see the hall multiple times. In fact, over 80% (10 adults) of repeat visitors came back to see the hall at least 3 or more times.

The numbers were opposite with the family groups. While adults tended to be repeat visitors, families were mostly one-time visitors. 22 adults and 18 of their children had visited the Hillman Hall of Minerals and Gems before, while 9 adults and 12 of their children had not.

Table 4. Repeat Visitors

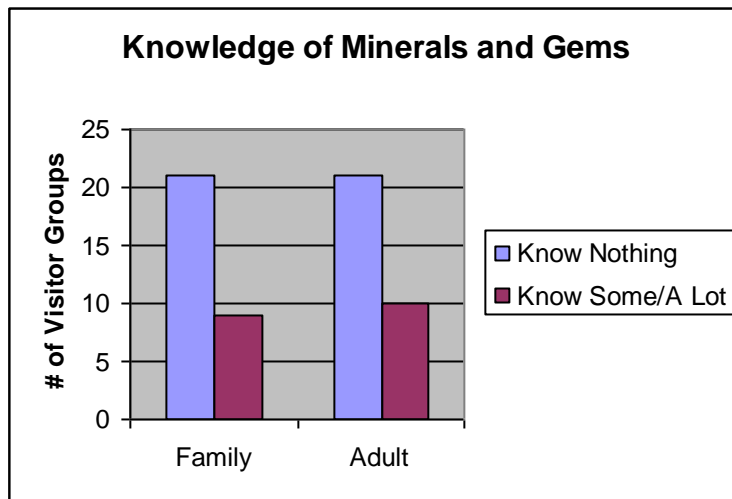


The distribution of repeat visitors was even across the board for families, as about six families had been back once, six families had visited around 3 to 5 time, and six had come more than 10 times. Also about half of the parents (14 parents) and one third of the children (10 children) had been back to the museum more than 3 times.

WHAT DO VISITORS ALREADY KNOW ABOUT GEMS AND MINERALS BEFORE VISITING THE HALL?

Overall, visitors are not coming into the minerals and gems hall with a lot of previous knowledge. When asked, slightly over two-thirds (21 adults, 21 families) knew nothing about gems and minerals prior to visiting the hall. The other one-third (10 adults, 9 families) felt they knew a little bit about gems and minerals but many did not feel confident about their knowledge.

Table 5. Knowledge of Minerals and Gems



The answers visitors gave on how they knew about gems and minerals was very varied. Of the four adults who knew a lot about gems and minerals, two were collectors and two had professions related to gems and minerals (science teacher and physicist/chemical engineer (spouse)). Adults who knew a little less had learned about gems and minerals because they enjoyed jewelry (3 visitors), had taken a class or done a project at school (2 visitors), or from their child who went through a rock and mineral phase when he was younger (1 visitor).

- Probably not, not scientifically. No, you think you do until you go in there and then you realize how little you know. (Researcher: *So are you a collector?*) We just like jewelry. (Adult #10)
- I know a little bit. I took a basic geology class before. (Adult #14)
- I know a lot about diamonds. That's about it. I researched them before I bought her ring. (Adult #31)

For families, most knew about minerals and gems through collecting. 4 children, 1 parent, and 1 child-parent pair (6 total families) said they collected minerals and gems. 3 parents and 1 spouse had a profession related to minerals and gems (2 teachers, a former coal mining engineer, and a scientist). Finally, 3 children knew about minerals and gems because they were interested in the topic.

- Well, I worked as a science teacher. I'm retired now... I have a set at home that I collected when I was in college. (Family #5)
- My son collects rocks and minerals. He knows a little bit about them. He's only 8. (Family #22)
- I don't think we're below average. I don't think we know too much. I think my daughter for her age, she reads some books on it. (*Researcher: And what about you?*) In the past. A long time ago. When I was a kid, I liked rocks, but I never got really too deep about it. (Family #26)

The number of reasons given is larger than the number of families who said they were knowledgeable about minerals and gems because some families gave more than one answer when they were asked how they knew about minerals and gems.

WHAT DID VISITORS LIKE THE MOST AND LEAST ABOUT THE HALL?

Both adult and family visitors found many positive things to say about their visit to the Hillman Hall of Minerals and Gems. For both adult and family visitors, words having to do with beauty and color consistently kept showing up in the visitors' responses. Families especially liked the birthstones and gems in the hall.

For adults, the top three favorites were the visual display of the hall (8 adults), the quality and diversity of the minerals (7 adults), and the general aesthetics of the minerals and gems (5 adults). Other favorite items included the amount of minerals the hall had (4 adults), learning about the locations of the minerals (4 adults), and the interactive exhibits (3 adults).

The most mentioned favorite exhibit spaces were the Fluorescence and Phosphorescence Exhibit (5 adults), the Gems Exhibit (5 adults), and the Systematic Collection (3 adults).

- I think the displays were very colorful. The lighting was really well. It showed off the colors of the gems. It was impressive. (Adult #12)
- I think the amount and the quality. I've been to a number of places before, and I've never seen as much diversification of stones. It's tremendous. (Adult #5)
- I like looking at the cut gemstones mostly because they're pretty. (Adult #14)
- I sort of liked the fluorescent room the best. They were cool to look at. I like how they were set up, there was the auditory, and it was sort of more of a presentation than just like an exhibit to look at... It's more of a multi-sensory learning experience. (Adult #9)

For parents, the top three favorites were a specific mineral or exhibit (19 parents), the color or beauty of the hall (12 parents), or everything (6 parents). Other parents mentioned liking the good display of the hall (2 parents), the variety of the minerals, or reading about the locations of the minerals.

The top four most mentioned exhibits were the birthstones and the precious gems (7 parents), the Fluorescence and Phosphorescence Exhibit (3 parents), the Systematic Collection, and the larger minerals in the hall (tied with 2 parents each).

- Gee, that's hard to say. It was all so nice and everything. I did like the one with the opals in there with the sparkling colors in it. That was pretty. That's my daughter's birthstone. (Family #5)
- Actually, the whole thing was so attractively displayed, it's all very interesting, so, whoever put the display together did a really nice job I think. The lighting is great, the collection is really diverse, so, all in all I'd have to give it pretty high marks. (Family #8)

Most children also mentioned a specific exhibit or mineral as their favorite (21 children). Additionally, 8 children enjoyed the color and the beauty of the minerals, 4 enjoyed the touchable or interactive exhibits, 4 children liked a particular mineral because of a science fact behind it, and 4 children liked everything. Other children mentioned the display (3 children) or the variety of minerals (1 child) as their favorite part about the hall.

- I know my daughter liked the pretty gems in the back just like I did, because of the way that they were presented. And my son who's six liked the things he could touch. The ones with the copper on it. (Family #17)
- Well Danny liked the amber too. Noah just liked the bright lights. He's one year [old], yeah. Dylan liked [the amber] because of the bugs in it, and the whole concept of that being ancient. (Family #23)
- I liked that big purple thing. (Mother: That was the geode.) [I liked the geode] because it was nice, and I like purple, the color purple. (Family #25)

The top four mentioned favorite exhibits for children were the birthstones and precious gems (9 children), the Fluorescence and Phosphorescence Exhibit (5 children), the amber (2 children), and the larger minerals (2 children).

Visitors felt content after visiting the hall and over half of the adults (16 adults) could not think of anything that they disliked about the hall. For adults, of those who did voice a dislike, the largest complaint was the missing gems that had been taken out for cleaning (6 adults). 5 adults also mentioned an issue with the display, such as wanting more explanations, hard to read signage, dislike of the placement of the birthstones after a natural exhibit, and too much wasted space. 2 adults mentioned their dislike of unattractive minerals. There was also a mention of being unable to touch the rocks, as well as having too many names to remember.

- That would be hard cause I mean it's always so fascinating to go through there and try to learn something. I can't think of anything that I don't like about that hall. (Adult #1)
- I kind of skipped over the meteorite part. I think the meteorites were easy to skip over. They were just kind of, hidden away there, in the corner. It might be a location problem. (Adult #9)
- The Pennsylvania exhibit. It could be a bit bigger or something. And I thought there was going to be more explanations for like how they were formed kind of things. But there wasn't. (Adult #18)

Again, like the adults, families didn't have a lot to say about their least favorite part of the hall. For both parents and children, most families stated none when asked what their least favorite part of the hall was (21 parents, 18 children).

Parents who gave more specific answers mentioned disliking the coal exhibit and unattractive minerals (4 parents), or that the hall was too hot (2 parents each). 4 parents and 4 children also mentioned the missing gemstones as their least favorite part of the hall. One other parent felt some areas of the hall were too dark.

- I think that the rocks that look just look dirty. That doesn't impress me. (Family #27)
- My least favorite was the coal, but we learned, obviously. ...Not a lot of pretty things are coming out of our ground that we stand on. That's why we are the Steelers. (Family #31)

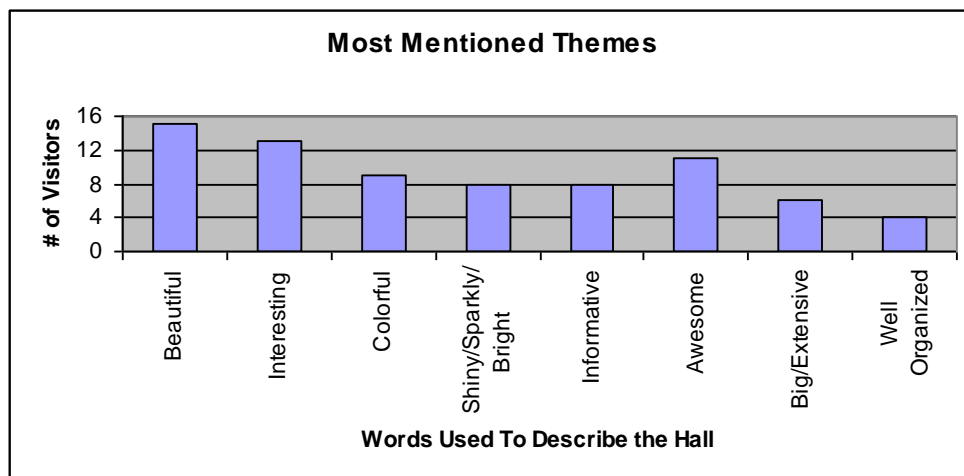
Children's least favorite aspects of the hall were not having enough interactive or touchable exhibits (3 children), not enough variety, excitement, or color in certain exhibit areas (3 children), disliking a specific mineral (2 children), or being too young for the hall (1 child).

- I think the initial part, they're not that interested in. The sulfur and all those, the first things you see. I think they like the other stuff. It's sparkly. (Family #7)
- Probably the fact that they can't touch things... [She] likes to touch everything. (Family #19)

WHAT ARE ADULTS TALKING ABOUT AND CONSIDERING DURING THEIR VISIT?

Adults were really enthralled by the beauty and hue of the minerals and gems. When asked to think of three words to describe the mineral and gems hall, the terms that came up the most were beautiful/pretty (15 adults), interesting (13 adults), colorful (9 adults), and shiny/sparkly (8 adults). Informative, enlightening, and something new was mentioned by 8 adults as well, but words related to learning and educational were not mentioned. 11 adults also gave general descriptor words such as awesome, amazing, fantastic, and nice.

Table 6. Most Mentioned Themes

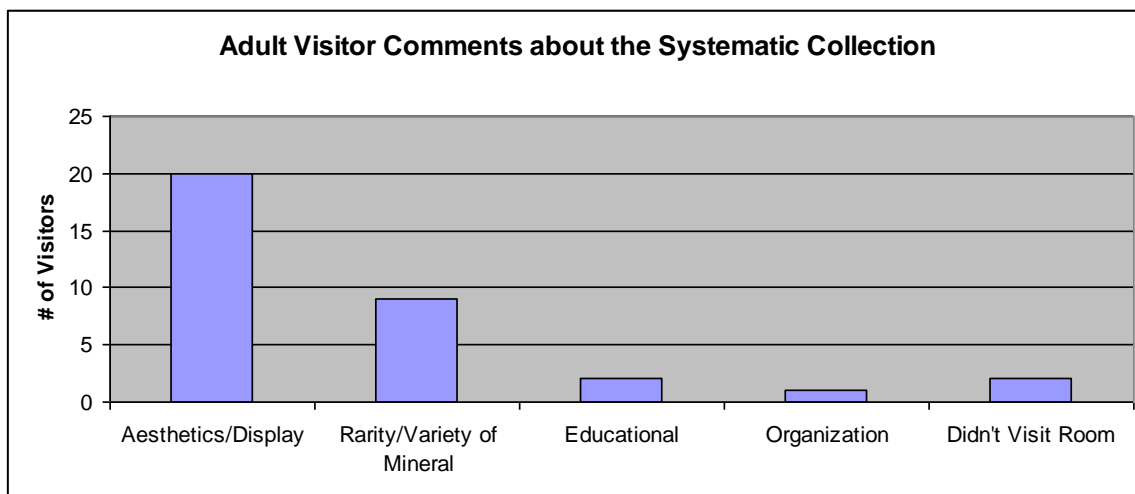


These themes of color and beauty reoccurred when adult visitors described their views on the hall's Systematic Collection and the Masterpiece Collection.

Visitors in the adult interview were asked what they thought about the systematic collection, and why the museum may have provided this collection. While one visitor mentioned that it might have to do with organization, no one seemed to understand that the Systematic Collection was scientifically organized based on the anions found in the atoms of the minerals. Instead, the large majority of visitors talked about the aesthetics of the minerals and the display of the room (20 adults). Many of the visitors were preoccupied about the mirrors when discussing the room, and several made a comparison to the room being like a jewelry store. While aesthetics was high on the list, visitors didn't seem to mind, and really enjoyed being in the room.

- The room was pretty cool. There wasn't a whole lot of information though about it, so you just kind of looked and thought it was pretty. (Adult #6)
- I was like, god I gotta go in there, like I skipped the rest of it and like, I want to go in there. It looked really neat. (Friend: The presentation with the glass and the mirrors was great.) Yeah, I liked that. I liked to see myself. (Adult #13)
- Oh, I liked that room. In fact, we were probably in there the longest. (*Researcher: What did you like about that room?*) Just the way it was displayed. I think it's pretty. It's like being in a jewelry store. (Adult #28)
- It was nice. I guess the mirrors reflect a lot of it. It's probably nice when you're looking at it away from the mirror, but it's distracting when you're looking toward the mirror. (Adult #29)

Table 7. Adult Visitor Comments about the Systematic Collection



A smaller number (9 adults) also discussed how the room may have been put up to display the rarity or variety of the minerals.

- I could spend hours in there. I really could. Just the, the variety of shapes and the colors and some of the textures. I mean you really wish you could touch some of

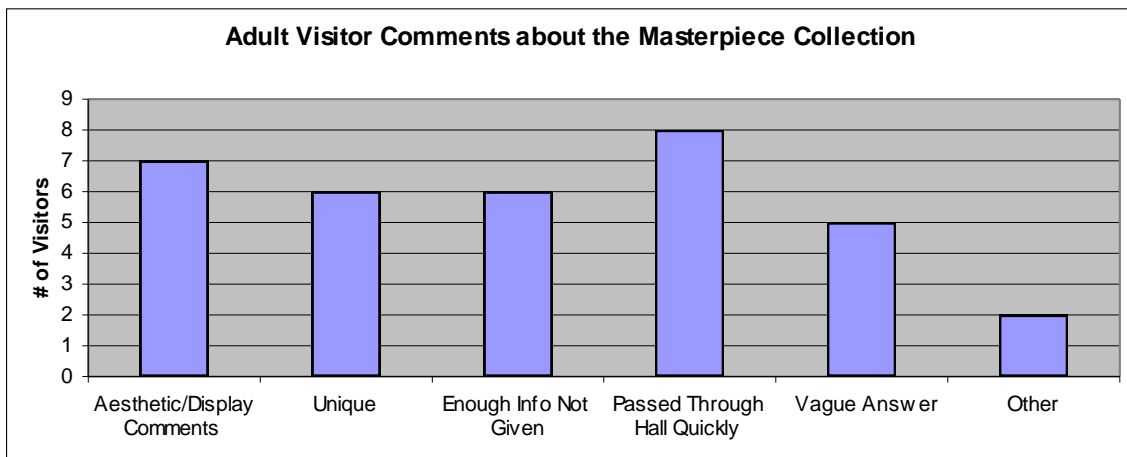
them, cause they look like they're such bizarre textures, and just the variety I think.
(Adult #8)

Additionally the 3 visitors mentioned that the room was educational or had some overarching organization, mentioned it only superficially.

- Um, to divide them up into groups, maybe? (Adult #3)

Visitors were asked what they thought about the Masterpiece Collection because the room focused purely on beauty and was an excellent example of the hall's theme "Minerals as Art". Some visitors were able to understand the aesthetic value and the rarity of the minerals, but the response was much lower compared to the Systematic Collection exhibit. Only 7 visitors directly commented about the aesthetic value or the display and 6 separate visitors mentioned the uniqueness of the minerals in that room. 8 visitors mentioned that they went through the hall quickly or that nothing really stood out to them, while 6 other visitors complained that there wasn't enough information or the labels were hard to see. Furthermore, 5 gave vague and non-descript answers, such as "It was interesting", with no further explanations.

Table 8. Adult Visitor Comments about the Masterpiece Collection



A reason for people going through the hall so quickly may be due to location and lack of information. The Masterpiece Collection is last, and several visitors mentioned that they had exhausted themselves by spending too much time in the previous exhibits. The names of the minerals are also printed lightly in a small font, and are placed at the top corner of the display cases. Visitors felt the labeling was hard to find, and mentioned wanting more context behind the minerals.

- Oh that's neat. It's a bunch of masterpieces. I liked it. (Researcher: *What do you mean by that?*) They're big pieces, and I'm sure they're rare. And they're neat to see cause you don't get to see them. I'm sure they're hard to find. (Adult #16)
- I kind of breezed through there. Yeah, there wasn't much to my interest, the big stones. You know, there was nothing here that- since I don't understand it, you don't tend to look at it for very long, you know, but if there was a little more explanation other than the name of it, where it was from. That's, if you don't tell me, I don't know that. (Adult #21)

- I think we kind of breezed through it. I think that they struck me as very unique things. I think by the time I got to that point in the exhibit, I was kind of like, all right. I'm done with looking at the rock stuff, let's go look at something else. (Adult #9)
- Oh yeah, they were good, too. We kept walking back to see what the name of it was. The names can be a little more easy to find, especially for us short people. (Adult #28)

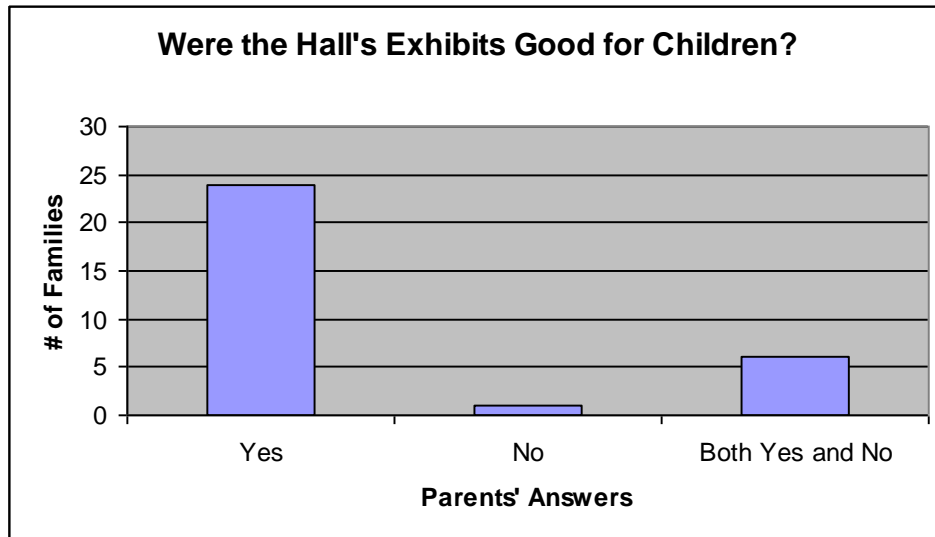
One visitor even mistakenly seemed to think these masterpiece minerals had been cut to make them look the way they did.

- Oh, I liked that one [because] I guess the stones were cut and more... I guess they were more, they weren't just natural as the other ones. It was all cut. Like it had the rough rock and then stuff with the cut rock. I thought that was interesting. (Adult #3)

WHAT ARE FAMILIES TALKING ABOUT AND CONSIDERING DURING THEIR VISIT?

For family interviews, we focused more on the children’s perspective of the hall. We asked parents if they thought the Hillman Hall of Minerals and Gems exhibits were good for kids. For the most part, parents felt the exhibits were well suited for children.

Table 9. Were the Hall's Exhibits Good for Children?



Those who felt the hall was good for children gave reasons mostly about the aesthetic aspects, such as the hall was set up nicely (4 parents), or was colorful, pretty, or had interesting shapes for children to look at (7 parents). Other parents felt that the hall was good because it gave the children exposure to the amount and variety of minerals in the world today (6 parents), or that the minerals in general were interesting or captivating (3 parents). 2 parents mentioned that they liked the hands-on exhibits in the hall, but 4 parents felt that more interactive or hands-on exhibits could be included. Finally, while 2 parents mentioned that the hall had a lot of information and that the children did learn something, the parents were vague on what those learning goals were.

- Each time we come here, they want to go to this place. I think that they are fascinated by the shape and then the color. (Family #14)
- Just the fact that there are so many different gems and rocks and forms of, you know, gems, crystals and things like that. Just a magnificent variety from all over the world. He wants to go to Mexico now to look for gems. (Family #20)
- The hands-on, the radioactive part, the phosphorescence one he [the child] liked. (Family #22)

Those who answered both yes and no, felt that the hall was good but better suited for older children (4 parents). They specifically mentioned that too much reading was involved and that young children's attention spans were too short to endure the entire hall. The one parent who felt the hall was not good for children felt it was because the museum needed to show or teach the information better.

- Well, it depends on the age. I'd say, no, not for like the very young ones. There's some things they, the very young ones I'm talking like, six, five, six, and even younger than that, that they would look at. But I think it's geared more toward the older children, like middle school, and into high school, and adults. But not for little kids, no [because] you have to really read about them. I mean, you can see how beautiful everything is, so visually any age can enjoy it, but as far as really learning about it, you have to really look at the fine print and I think that's probably one of the main reasons. (Family #6)
- [For] older kids, yeah. My nephew would really like that. He's kind of collecting gems and minerals so he would really like it, yeah. (R: *What about for younger kids?*) Not really. More touch. Like if there were more things that they could touch, probably. Like, well, she's not even 3 yet, so you know, it's hard to keep her attention for anything. (Family #28)

What is interesting to note is that parents who felt the hall was good made surface comments on the beauty, exposure, uniqueness, and the display, no parents mentioned the scientific learning potential of the hall.

We secondly asked parents if they had talked about any of the signage with their children. Parents' answers varied, with 19 answering yes, and 12 answering no.

When parents were asked what they talked about with their children when discussing the signage, about half of the parents (10 parents) said they discussed a specific exhibit. The most mentioned exhibits were the Pennsylvania Minerals Exhibit (3 parents), the meteorite (2 parents), and twinning (2 parents). Other parents talked about the amber, coal, birthstones, and the different crystals. 2 parents also mentioned talking to their children about where the minerals came from.

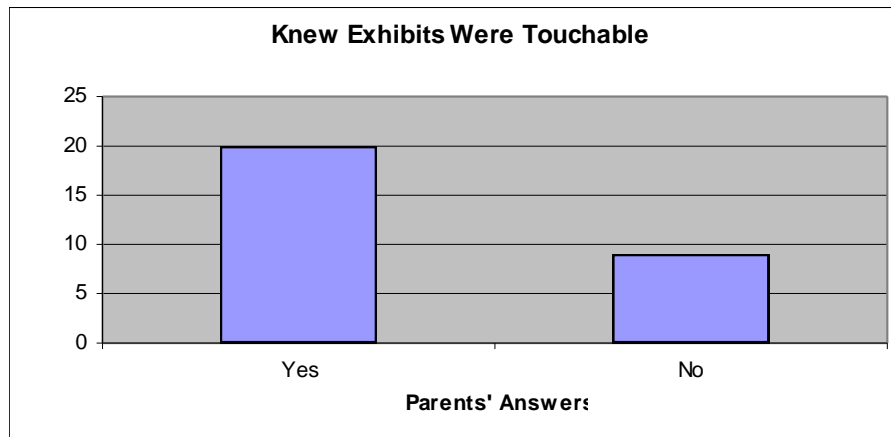
- Yeah, we did. We looked at the signs. We found the ones that were Pennsylvania. That was interesting too, just the stones that were coming from here. (Family #12)
- Yes, I did. Just some of it I did read to her. The birthstones basically is what we talked about. (Family #2)

Of the other 7 parents who stated that they did discuss the signage with their children, 5 parents either gave a vague answer, or said they didn't remember. 2 other parents said they didn't discuss a lot because of the high energy and the short attention span of their children.

- I'm trying to. It's just that he's six and he moves very quickly. His attention span is very short. (Family #17)

We finally asked whether parents realized that some of the exhibits were touchable. Two-thirds of parents (20 parents) did realize that some of the exhibits were touchable, but 9 parents stated that they had no idea that you could touch certain exhibits.

Table 10. Families Who Knew the Exhibits Were Touchable



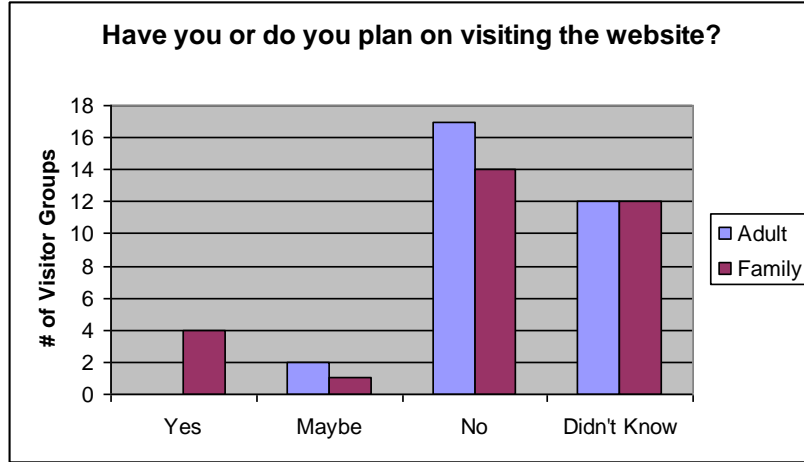
Of the exhibits mentioned, an equal number of families said they touched the Float Copper and the Meteorite (5 families each). One family also mentioned touching the Phosphorescence and Fluorescence exhibit, while another family mentioned the Touch Mars exhibit, located outside the hall.

- Mm-hmm, yeah. We touch everything that we can. Everything that says touch, we touch. (Family #8)
- Yeah. I tried to figure out which ones he was allowed to touch. I figured if there was a rope up, that meant no touching. (Family #17)

DID VISITORS USE ANY EXTERNAL RESOURCES?

Visitors in general, did not take the opportunity to use the external resources the museum provides to learn more about the hall. When visitors were asked if they had ever visited the Hillman Hall of Minerals and Gems website, for adults, the answer was a unanimous “No”. For families, 4 parents mentioned that they already had or did plan to visit the website.

Table 11. Visitors and the Website



One issue was that many visitors (12 adults, 12 families) hadn't known a website even existed.

- I hadn't planned on it, no. Didn't know about it. (Adult #19)

After the visitors were told that a website does indeed exist, 2 families and 6 adult visitors stated that they may visit it, two explicitly mentioning that they would if they had a question or if they needed more information. Additionally, 4 adults and 5 families said that now that they know a website exists, they would definitely visit it.

- I didn't know you had one. (Researcher: *Oh, ok. So now that you know, do you think you would visit it?*) Absolutely. Or, my mother will. It's very likely. She really likes that. (Adult #26)
- You know what? I didn't know they had a website, so, yes, I will. Now that I know, sure. (Family #6)

One visitor even planned to use the souvenir shop as a resource for further information under the assumption that such information would be available.

- That's an idea. We'll probably get, [it will] probably be in some of the information that we get from the souvenir shop. I'm sure we can get a whole list of websites. (Adult #29)

Both families and adult visitors were not using any of the staff and guards as resources either. Only one adult visitor mentioned speaking to a staff member, but the experience he had was very positive and enlightening.

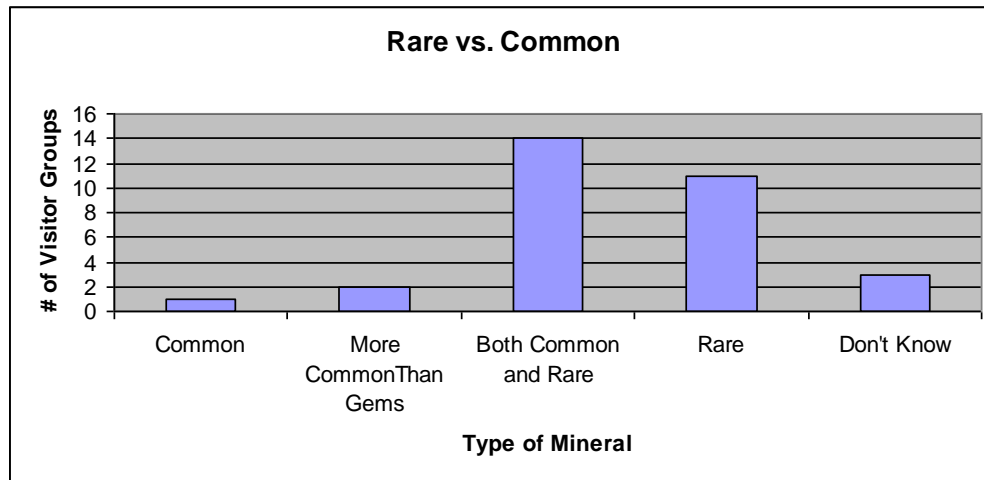
- That guy showed us a few unique items. Some of the older ones were established and some of them were newly discovered - the specimens. So, quite helpful. (Adult #29)

Finally, most of the visitors had not seen the yearly Gem and Mineral Show the Carnegie Natural History Museum hosts every year. Only 3 of the 31 adults and 4 of the 30 families had seen the show before. 2 adults and 1 family mentioned they had seen the show before, just not this past year.

WHAT DID ADULTS LEARN AFTER VISITING THE HALL?

Visitors were asked how common they thought the minerals were in the Hillman Hall of Minerals and Gems. It had been mentioned to me through several sources that many of the minerals in the Hillman Hall were priceless and one-of-a-kind pieces, and I wanted to find out if visitors could make this generalization after being in the hall. In general, while most visitors concluded that there were many rare minerals in the hall (25 visitors), answers still varied.

Table 12. Rare versus Common Minerals



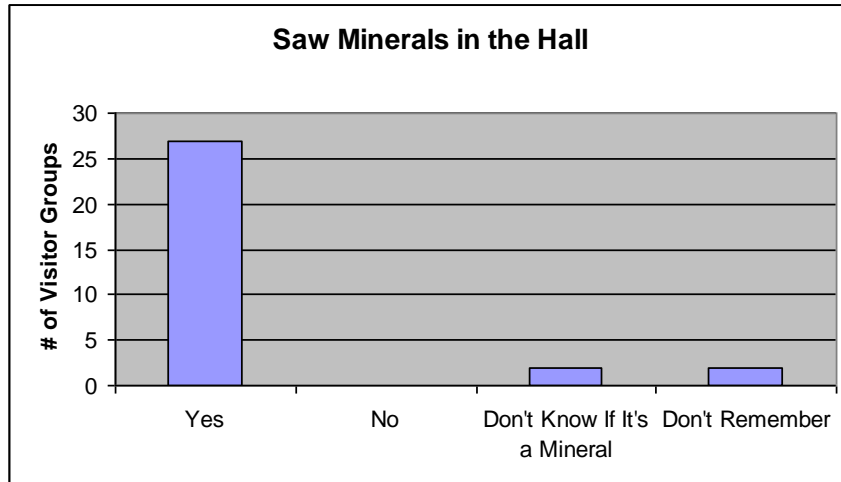
Three visitors had no idea into which category the minerals fell into. There was also a large split between visitors who thought all of the minerals were rare (11 visitors) compared to those who felt that the hall contained a mix of common and rare minerals (14 visitors).

The next three quotes represent the range of answers that were given:

- Hmm, I would say a mineral's more like a rock or something you process. A gem is a very, very rare item compared to a mineral, I would think. (*Researcher: So how common do you think the minerals are in this hall?*) I think they're common. Minerals are pretty common. (Adult #21)
- Some, such as quartz, I think are very common. And then I know they've got some rare minerals here. Things that you just don't hear of. (Adult #1)
- Very rare. Very rare. Extremely rare. I was thinking that the whole time. I don't think I would ever encounter any of these things. Ever. (Adult #22)

To gain an understanding of what baseline knowledge a visitor had on gems and minerals, two additional questions were asked. The first was to see if a visitor knew what they were looking at (i.e. a gem or a mineral), and if they could remember the names of the ones they saw.

Table 13. Adults Who Saw Minerals in the Hall

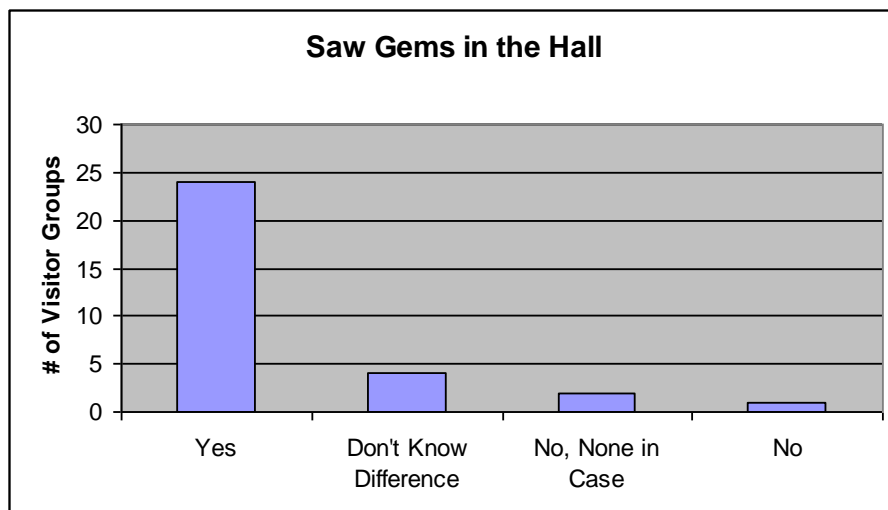


For the most part, visitors knew they had seen minerals in the hall (27 adults), although 2 stated that they couldn't remember if they had seen any minerals. 2 more visitors mentioned feeling confused about whether they had just seen minerals or if they had seen gems.

Of those who saw minerals, the top five most recalled minerals were quartz (13 adults), calcite (9 adults), gold (6 adults), amethyst (4 adults), and copper (3 adults).

A slightly smaller number of visitors answered yes when they were asked if they had seen any gems (24 adults). Of those who answered otherwise, 4 stated that they didn't know the difference between a mineral and a gem, and thus could not answer. 2 said no, because the display cases that normally held the gems were empty, and one said no because they were walking quickly through the hall and didn't stop to view the gems.

Table 14. Adults Who Saw Gems in the Hall



The top five gems remembered were diamonds (6 visitors), emeralds (6 visitors), rubies (4 visitors), amethyst (3 visitors), and topaz (3 visitors). 6 visitors also just generally mentioned birthstones as well.

A second question that followed was if a visitor knew what the difference was between a gem and a mineral, and most people did not. Of the 30 visitor groups asked, 8 visitors were able give a correct answer. 19 visitors stated that they did not know the answer, while 3 visitors incorrectly attempted a guess.

When visitors were asked to name one thing they learned after visiting the hall, three types of answers emerged: (1) those who stated a technical fact, (2) those who made an observation, and (3) those who stated a topic or term but did not elaborate, or could not remember what they learned in the hall.

The largest group consisted of those who made an observation statement about the Minerals and Gems Hall (12 visitors). Visitors who answered with an observation made general statements about the hall that typically could not be found on a sign. Many of these comments were about the variety, amount, and uniqueness of the different minerals. For example, several visitors found it remarkable that Pennsylvania contained so many different minerals.

- I noticed just the fact that there were so many different [minerals], and there's a lot more in the region too. I saw that there was that regional exhibit. I didn't know all that stuff was found here. (Adult #27)
- Well, for me, it's just always amazing to see what there is. The variety of substances that are in our world, and it's just awesome. (Adult #20)

The second largest group were visitors who answered with a technical fact (10 visitors). A visitor who gave a technical fact was able to relay back a topic he or she learned about, and give an explanation of what that fact was.

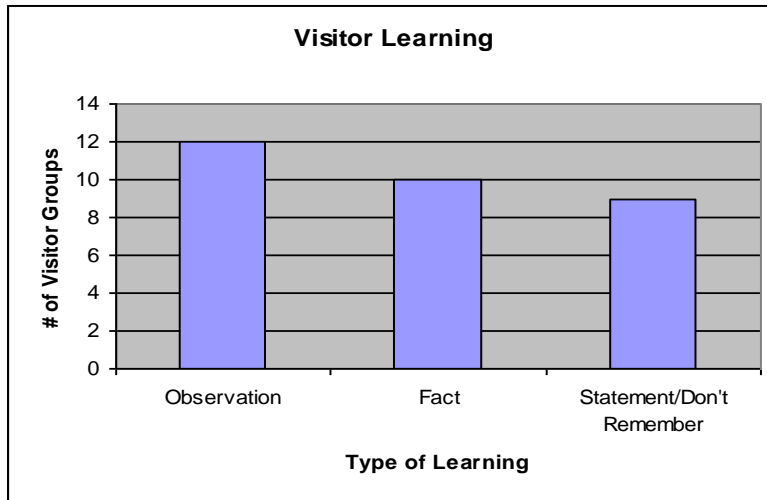
- One thing I learned today about gem colors. They have to actually have a flare for the artistic, cause they've got to look at that gem and decide how the light goes through it and which displays it the best. I never realized that. (Adult # 13)
- I guess the big thing that I learned today is that quartz is most common in the earth's crust because of all the silicon in there, and I was trying to guess if that means amethyst would be the most common gemstone to come from there, but I didn't see that information. (Adult # 14)
- I learned about the different, like monoclinic and the isometric. About the different shapes of the rocks, and that they have an internal axis - different square ones. Like I said, I was interested in the square ones. (Adult #22)

The third group (6 visitors), were visitors who did not engage too deeply into the content of the hall. These visitors were only able to make a statement about the hall, and did not really elaborate their answers. Some visitors also admitted to not having learned a lot.

- What did we learn in that little show type thing in there? We listened to that. (Researcher: *The phosphorescence room?*) Yeah. We did. We learned stuff in there. (Adult #6)
- There was something we learned. I forgot what it was though. (Adult #8)
- Not yet. I have to give it a closer look next time. (Adult #24)

The fairly even distribution of visitor learning can be seen in the chart below.

Table 15. Adult Visitor Learning

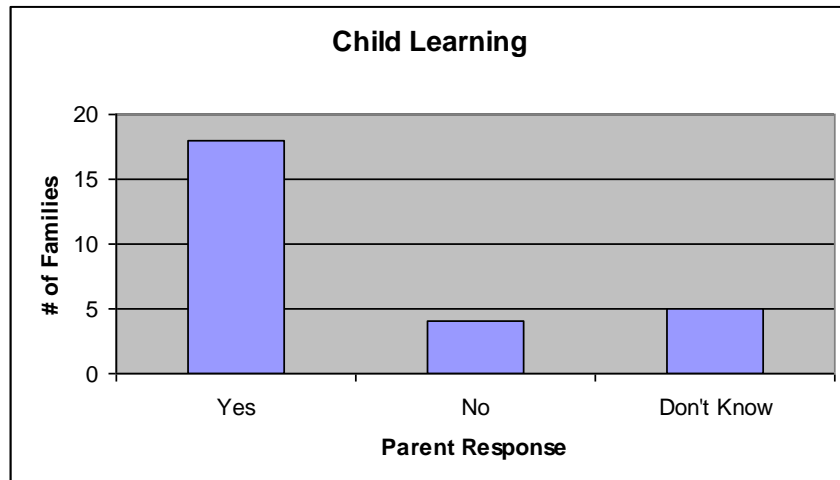


The five top most memorable topics were the Phosphorescence and Fluorescence Room (7 visitors), the Radioactive Exhibit (3 visitors), the exhibits on crystal formations and twinning (3 visitors), the Birthstone Exhibit (2 visitors), and the Pennsylvania Minerals Exhibit (2 visitors).

WHAT DID FAMILIES LEARN AFTER VISITING THE HALL?

We also asked families if they or their children learned anything during their visit. When we asked parents if they thought their child learned anything, while the majority of parents said yes, several answered no, or that they weren't sure.

Table 16. Child Visitor Learning



Of the 18 parents who said yes, most parents talked about a specific exhibit or a fact their child had learned from an exhibit (7 families). 3 parents said their children learned about where minerals

come from, and 3 other parents said their children learned the names of some gems, minerals, and crystals.

- I think she learned that there was two different crystal types. The different types of crystals. She actually pointed that out to me. (Family #26)
- They like to see the nameplates that say different states, or whatever... They, they like to see that. That's in Arizona, we've been there. (Family #18)
- She learned about how it comes from the ground, and there are rocks and they are inside of rocks, and stuff like that. Yeah. Cause she's three. She's back there. (Family #27)

Five parents felt their children were learning by gaining exposure to minerals and gems.

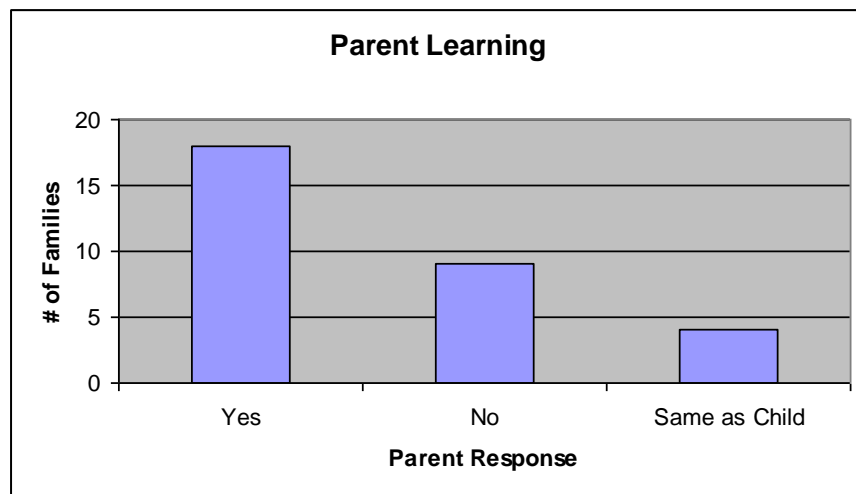
- They learned there's an awful lot of minerals out there. A lot that they haven't seen. (Child: Yeah. There's a lot I haven't seen in there. I've never even heard of.) (Family #29)

Those who said no (4 families) or don't know (5 families), reasons included not having enough time in the exhibit, lack of interest, inability to read signage, or due to the young age of their child.

- I hope so. He wasn't too much into reading it, but he certainly did get an eye for them. (Family #20)
- He's 18 months. That's probably, nothing will be retained if he did learn it. (Family #4)

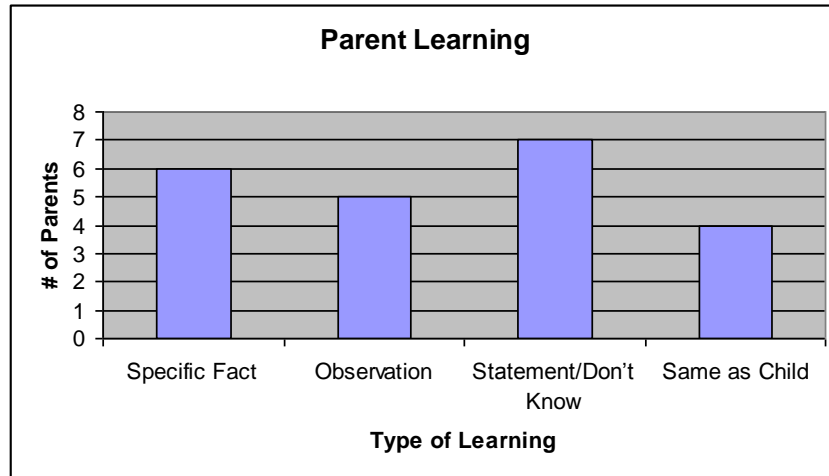
For parents, while a number of parents said they learned something too after visiting the hall (18 parents), almost one-third of parents (9 parents) said no, they didn't learn anything. 4 parents said what they learned was the same as what their child learned.

Table 17. Parent Learning Responses



Using the same learning organization as the adult interviews, when parents were asked what they learned, 6 parents mentioned a specific fact, 5 mentioned an observation statement, and 7 parents made a statement about the hall, or said they didn't know what they learned.

Table 18. Parent Learning: Type of Learning



A 'Specific Fact' Example:

- I didn't know that there was a halite. I didn't know that the sodium of chloride made that crystal structure yet. So, I didn't know what it was called. (Family #26)

An 'Observation' Example:

- I learned a little bit about the fact that they come in such a variety. I never realized. The variety was so much... and there was really so many different ways that gold is found in - it's in lacy form and these big chunks. Same way with so many of the other rocks too. (Family #20)

A 'Statement/Don't Know' Example:

- I read about a few of them. Just... I can't remember now what it was. I read about some of them. (Family #2)

A 'Same as Child' Example:

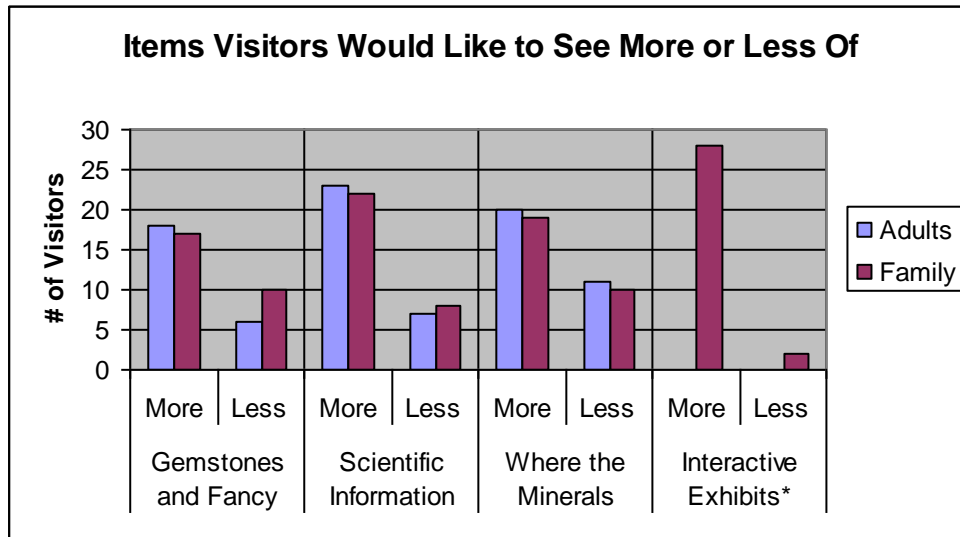
- I learned what they learned, you know. Some of it I forgot because I hadn't been here in a while. (Family #18)

This overview shows that not too much learning is occurring for adults and families. The museum needs to decide what they want visitors to learn, but we also asked visitors what they would like more or less of.

WHAT WOULD VISITORS LIKE TO SEE MORE OR LESS OF AFTER VISITING THE HALL?

Both family and adult visitors were asked whether they would like to see more or less of the following three items: gemstones and fancy jewelry, scientific information, and where the minerals came from. Many adults mentioned wanting to see more interactive exhibits, so an additional question was added to the family interviews asking them if they wanted to see more interactive exhibits as well.

Table 19. Items Visitors Would Like to See More or Less Of



**Note: Only families were asked if they wanted to see more or less interactive exhibits.*

For gemstones and fancy jewelry, many people mentioned they were interested in seeing more, either because they didn't see any fancy jewelry in the exhibit, or because they wanted more information on the subject. Overall, 18 adults and 17 families said they wouldn't mind seeing some more gemstones and fancy jewelry. 6 adults and 10 families said they wouldn't mind seeing less of them, 4 adults and 2 families felt the amount should stay the same, and 3 adults, and 2 families were interested in seeing more gemstones, but not the jewelry.

- Yeah, that would be fine. Women like jewelry, so it's always neat to see. It's neat to see how the rocks, the gems look dull until they cut them out and stuff. (Adult #2)
- Yeah, more of those would be nice. It would be interesting to see how the gems are utilized, you know, with fashion and all so that would be kind of nice. (Family #8)
- If you do put the jewelry in, I think having a history of the jewelry also would be worthwhile. (Adult #9)
- You mean as far as the stones go? I think you did quite a few of them. I would just like to see a little bit more explanation about them but other than that, it's very nice the way it is [because] I don't know how much more I can look at... Yeah, you have so many. It's overwhelming as it is... If I start to look at too many more, I would get bored. Then I would find a way out. I can take shots of 15 minutes. I wouldn't make it any bigger, you know, your eyes are starting to haze over after while. (Adult #21)

As for scientific information, both adults and families wanted more as well. 23 adults and 22 families said they would like to see more scientific information, 7 adults and 8 families said they could use a little less, and 1 adult and 1 family felt the content should stay the same. While visitors wanted to see more science, many complained they had trouble synthesizing the information because it was overwhelmingly long or hard to understand. Some suggested putting the content in “layman’s terms” so that a person who knew nothing about gems and minerals could come in and learn something in a minute or two.

- Yeah, they should do that. Like a short one or two sentence. If I see a big paragraph, I can't break it down. (Adult #13)
- Yeah, as long as it was easy to understand; put it in laymen's terms. (Family #16)
- I would like a little bit more, just a little bit more. Not so much with the big names. The big names doesn't do a thing for me. But maybe something, you know, for us laymen that are just trying to learn a little bit about the history, just to kinda understand it a little more would be nice. (Adult #21)
- I don't know. There was just, I touched just the surface on it, so I couldn't tell you whether it needs more because I'd have to come back and do a lot more reading to tell you whether it's enough. I just touched the surface of it. (Family #20)
- Probably a little bit more. I might have learned more about it if it was more easily displayed and easily read around a crowd at a display. (Adult #12)

Others suggested different levels of signage or even a computer database for different learners so that people could gain however much knowledge they wanted.

- [If] they try to break it down more step-by-step rather than just like boom, this is a... Cause she got interested in that but and then for her to think about crystals and stuff, it would be nice to have different levels added to that for different ages, so. (Family #26)
- That's the thing where you'd have to know, you'd still have to have some knowledge... you'd have a name and a place and basically you'd have to have your own knowledge, but maybe it'd be a computer center where you could learn more about this one element or whatever and then you could go... like a database or whatever you have here that would open up more information about a specific gem. (Adult #29)

With where the minerals came from, people generally stated they could use more of that as well. 20 adults and 19 families wanted to see more, 11 adults and 10 families wanted to see less, and 0 adults and 2 families wanted the information to stay the same. What visitors were really interested in learning about was the process of how minerals are found, rather than just knowing the location. For example, visitors wanted to find out how people find minerals, how they are dug up, or if there is a special story behind one of the international pieces.

- I just thought maybe more about how they're, how they get them... Like, they're all sitting in the case, you know, it's like, how people have actually had to go and find them. You know, what did they do to get them from one form to the other (Family #18)

- More, yeah... I mean, what do you- ok, you pick the rock and you set it up and you put a lot of lights on it, does it have any value other than the fact that it's rare?... And [do] you do anything with it?... A little explanation of it. You know these do this or they don't do nothing. I mean, if it's rare, what makes it rare? (Adult #21)
- Probably more of that. I know the one thing that I didn't know that I wanted to know was how they get them out of the earth without disrupting the beauty. (Family #2)
- That would be interesting, especially in some of the international pieces that you have. They just say what they are and where they're from, but whether they're special for some reason or have some special history. That would be interesting to me. (Family #12)
- I think if you really need to know like, where, like not, not just say, it was found in California, but, found like in a mine, but found in, you know, as a result of a volcanic whatever. That would be neat to see where that stuff formed, what process made it form. (Family #16)
- As far as the excavating and the mining and different things like that, there could be something that says Pittsburgh, Pennsylvania. You could do something regarding even, even that particular area of coal mining and steel and production and stuff like that, how its used and how the old coal mines, people using like to know how coal was mined at one time or another and have a little booth where you could see footages from long ago of coal mines and different types of mining that we did in Pennsylvania years ago. That would be interesting because, uh, that's probably all forgotten by now, so. (Adult #29)

Finally an overwhelming number of visitors wanted more interactive exhibits. When asked, 28 families said there should be more interactive exhibits, while 2 families thought it should stay the same. 7 families specifically mentioned that more interactive exhibits would be especially good for keeping children interested.

- Definitely, same or more. I think that really keeps younger kids interested in coming back. (Family #9)
- Yeah. As somebody who has children, I think, yeah. Cause then that might spark more of an interest for kids to look into it more. (Family #6)
- Yeah, yeah. That should be a focus point. At least for kids, they enjoy it, or something like that. (Family #5)

No family thought there should be less, but one parent hesitated in having too many interactive exhibits for fear of ruining the exhibit.

- Maybe one. I don't think- I think it would be ruined maybe if there were too many interactives, cause some things are just meant to be looked at. (Family #2)

While adults were not asked if they would like to see more interactive exhibits, when they were asked if they would like to see anything else, several (6 adults) did mention that they wanted more interactive, touchable, and multimedia exhibits for themselves as well.

- It might be nice if there was more, if you could touch some of them. I don't know if that would ever be possible but it might be kind of neat. Hands on. (Adult #12)
- Yeah, the radioactivity was neat. More things like that would be cool, like the interactive displays. (Adult #31)

Other suggestions included having more child-friendly exhibits, knowing the value of the mineral and industrial or daily life applications of the minerals, gem processing, history of the jewelry, and more explanations with shorter and easier to read signage.

- Just anything more that, you know, would attract a child. That would make them have questions, and be interested in science, and stuff like that. (Family #24)
- For example, I would like to see the information. Where it is used, in which industry, or, that kind of information, in the daily life, where we can see them. That kind of information would be helpful and would help us to figure out. For example, you see the mineral over there, but you really don't know where it is used and what it's for. It might be, I mean, helpful. (Adult #7)
- Maybe the value of them might be interesting to know. Carat weight per value of the different minerals would be interesting. The practical application probably. Uses of them. Things like that. (Adult #12)
- [Minerals and gems] is a field that most people don't know very much about, so I think any information is nice. (Adult #10)

RECOMMENDATIONS

IF YOUR GOAL IS TO INCREASE LEARNING, CONSIDER THE FOLLOWING SUGGESTIONS:

- Many visitors stated that they want more context behind where the minerals and gems come from. Provide a history about how minerals and gems are found, dug up, and brought to the museum. To generate a higher level of engagement with the visitors, include background stories about the most unique minerals or gems, such as why a particular mineral is rare, or how they are used in everyday life.
- In rooms where minerals are easily observed and compared, such as the Systematic Collection, consider also teaching simpler concepts such as the importance of scientific observation.
- Create shorter and easier to read signage. Rather than remove or reduce text from signage, create signage in “layman’s terms” or structure the signage so that a novice can easily get a quick overview of the main ideas, while the expert can keep reading further for more detailed information.
- Make sure all of the signage is visually prominent. For example the science signage in the Systematic Collection is concealed in the corners of the hall, and thus was not noticed by most visitors. The Masterpiece Collection had no signage about the minerals located in the room, except for a barely visible name and the location in the top corner of each display case.
- Advertise the website better. Visitors are currently not using the Hillman Hall of Minerals and Gems website. Many stated they did not know a website existed, but after they found out one did, several expressed an interest in visiting it.

IF YOUR GOAL IS TO MAKE THE HALL MORE FAMILY FRIENDLY, CONSIDER THE FOLLOWING SUGGESTIONS:

- Include more multi-sensory experiences. The Fluorescence and Phosphorescence Exhibit was highly regarded because of its unique presentation of information. Almost all of the families were also interested in seeing more interactive and touchable exhibits, especially for the younger children. Many adults also expressed interest in seeing interactive exhibits as well.
- Make sure all exhibit spaces are at visible to both children and adults. For example several exhibit spaces, such as some of the minerals in the Pennsylvania Exhibit, were too tall for even some adults to see.

IF YOUR GOAL IS TO INCREASE THE IDEA OF “MINERALS AS ART”, CONSIDER THE FOLLOWING SUGGESTION:

- Put the most fantastic pieces at the beginning of the hall. For example, the Masterpiece Collection is located at the end of the hall. Even though this room had some of the rarest minerals, visitors did not appreciate them as much as some of the previous minerals they had seen because they felt exhausted after reaching that room.

APPENDIX A: ADULT INTERVIEW QUESTIONS

1. Have you been to the Hillman Hall of Minerals and Gems and before?
 - A. If yes, how many times?
2. Have you visited or are you planning on visiting the Hillman Hall of Minerals and Gems Website?
3. Did you see the Gem and Mineral Show in November?
4. Why did you decide to visit the Minerals and Gems Hall today?
5. Do you know a lot about gems and minerals?
 - A. If Yes: How do you know about Gems and Minerals?
 - B. Do you have any in your daily life?
 - C. Are you a collector?
6. How long did you spend in the hall today?
7. Did you speak to any staff or guards today about the Hillman Hall of Minerals and Gems?
8. What was your favorite part about the Minerals and Gems Hall? Why?
9. What was your least favorite part about the Minerals and Gems Hall? Why?
10. Can you think of 3 words to describe the Minerals and Gems Hall?
11. Did you see any minerals today?
 - A. If Yes, which ones?
12. Did you see any gems today?
 - A. If Yes, which ones?
13. What's the difference between a mineral and a gem?
14. How common do you think are the minerals in this hall? Common, Rare, In the Middle, or Don't Know?
15. What did you think about the Systematic Collection?
Probe: Why do you think the CMNH put up the Systematic Collection?
16. What did you think about the Masterpiece Collection?
Probe: Why do you think the CMNH put up the Masterpiece Collection?
17. Can you name one thing you learned today after visiting the Hillman Hall of Minerals and Gems?

18. The museum is planning on redesigning the hall next year. Do you think you would like to see more of these types of items, less of these of these types of items, or keep it the same?

- A. Gemstones and Fancy Jewelry
- B. Scientific Information
- C. About where the minerals came from?
- D. Other

19. Is there anything more you would like to know about gems and minerals that the hall left unanswered for you?

20. Do you have any other comments about the hall?

Thank you for your time!

APPENDIX B: FAMILY INTERVIEW QUESTIONS

1. Have you or your children been to the Hillman Hall of Minerals and Gems and before?
 - a. If yes, how many times?
2. Have you visited or are you planning on visiting the Hillman Hall of Minerals and Gems Website?
3. Did you see the Gem and Mineral Show in November?
4. Why did you decide to visit the Hall today?
5. Do you or any of your children know a lot about gems and minerals?
 - a. If Yes: How do you know about them?
 - b. Are you a collector? Do you have any in your daily life?
6. How long did you spend in the hall today?
7. Did you speak to any staff or guards today about the Hall?
8. What was your favorite part about the Hall? Why?
9. What was your least favorite part about the Hall? Why?
10. What do you think your child/children's favorite part was about the Hall? Why?
11. What do you think your child/children's your least favorite part about Hall? Why?
12. Do you think your child learned anything today? What do you think s/he learned?
13. Can you name one thing you learned today after visiting the Hillman Hall of Minerals and Gems?
14. Do you think the Minerals and Gems Exhibits were good exhibits for kids? Why or why not?
15. Did you talk about the signs with your child/children? What did you talk about?
16. Did you know that some of the exhibits were touchable?
17. The museum is planning on redesigning the hall next year. Do you think you would like to see more of these types of items, less of these types of items, or keep it the same?
 - a. Gemstones and Fancy Jewelry
 - b. Scientific Information
 - c. About Where the Minerals Came From
 - d. Interactive Exhibits
 - e. Other: _____

18. Is there more you would like to know about gems and minerals that the hall did not answer?
What was that?

19. Do you have any other comments about the hall?

20. What are the ages and genders of your children?

Thank you for your time!