

Usability – Visitor Interface for the Axiovert200M XYZ Control

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THIS IS **NOT** A DEFINITIVE FINAL REPORT

FORMATIVE evaluation studies like this one often:

- **are conducted quickly**, which may mean
 - small sample sizes
 - expedited analyses
 - brief reports

- **look at an earlier version** of the exhibit/program, which may mean
 - a focus on problems and solutions, rather than successes
 - a change in form or title of the final exhibit/program

Imaging Station - Formative Evaluation Usability – Visitor Interface for the Axiovert200M XYZ Control

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PURPOSE

- To determine if visitors are able to use the visitor interface (xyz control via a game pad) to remotely control the Axiovert200M
- To identify difficulties visitors have using the visitor interface
- To identify questions visitors have about what they see for the amoeba and zebrafish specimens

These results feed into an iterative process to develop a usable visitor interface with accompanying content for the Axiovert200M.

SETUP

- Axiovert200M
- MCU28
- Display
 - Sony Color video Camera DXC-390
 - Apple Cinema Display at 800x512
- Metamorph version 5.0
- Game pad control: joystick2002_11_13b
- Specimens - The visitor interface was evaluated using two specimen types: Amoeba and Zebrafish.
 - Amoeba –some movement with other organisms including bacteria (food for amoeba) and food for bacteria
 - 10x objective
 - XY
 - limits set to a 3000 micron x 3000 micron square area
 - game pad control (Figure-1)
 - Z
 - limits set to $-113.775 < z < 12.8$
 - game pad control (Figure-1)

- Zebrafish in various stages of development
 - o 5x objective
 - o XY
 - limits set to a 8000 micron x 8000 micron square area
 - game pad control (Figure-1)
 - o Z
 - limits set to $-738 < z < -146.125$
 - game pad control (Figure-1)



Figure-1. Gamepad control

METHOD

- Cued Interviews
- Visitors were recruited individually from the Life Sciences Area on the Mezzanine of the Exploratorium
- Before each interview, the evaluator made sure that there was nothing in view on the monitor. Then, each visitor was asked to use the game pad (shown in Figure-1) to find something to look at under the microscope and to tell the evaluator when s/he has found something.
- Each visitor was then asked a series of questions about the experience and about what s/he saw.

PARTICIPANTS

- Gender

Specimen: Amoeba

Gender	count
female	5
male	7
Total	12

Specimen: Zebrafish

Gender	count
female	5
male	6
Total	11

- Age Group

Specimen: Amoeba

Age Group	count
adult	9
teen	1
child	2
Total	12

Specimen: Zebrafish

Age Group	count
adult	10
teen	0
child	1
Total	11

FINDINGS

Usability

All the visitors were able to eventually find a specimen to look at.

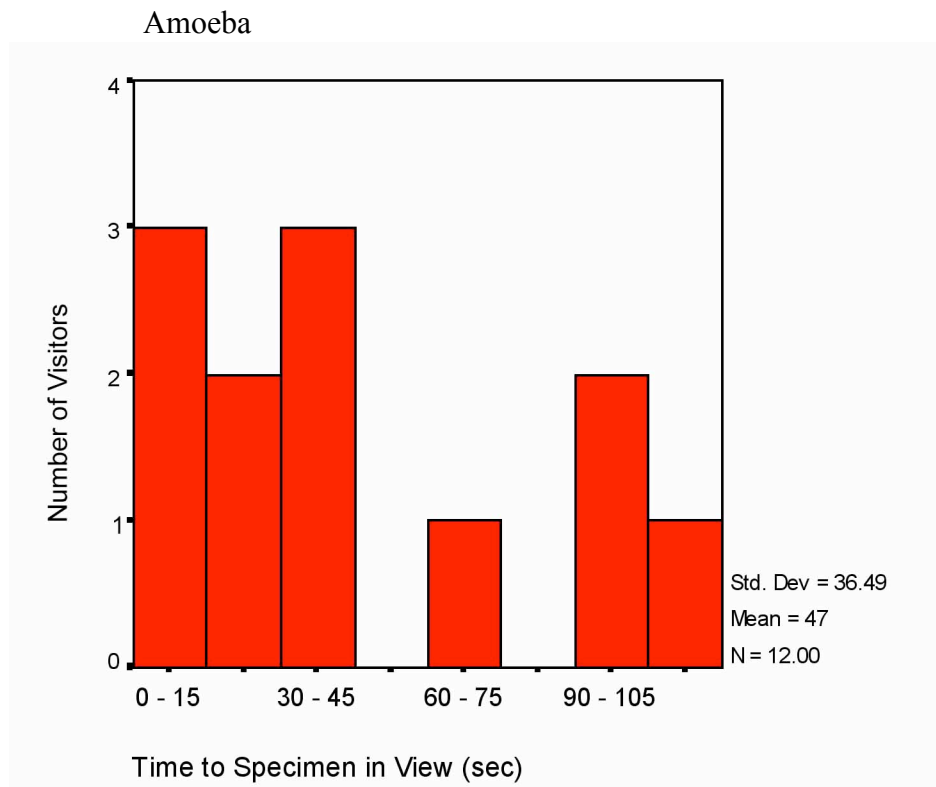
How long did visitors take to find the specimen?

Self-reports of when the visitors found something were unreliable since most visitors forgot to tell the evaluator when they had found something to look at under the microscope. Instead, we chose to look at three measures for determining how quickly visitors were able to find the specimen with the visitor interface. That is, we measured:

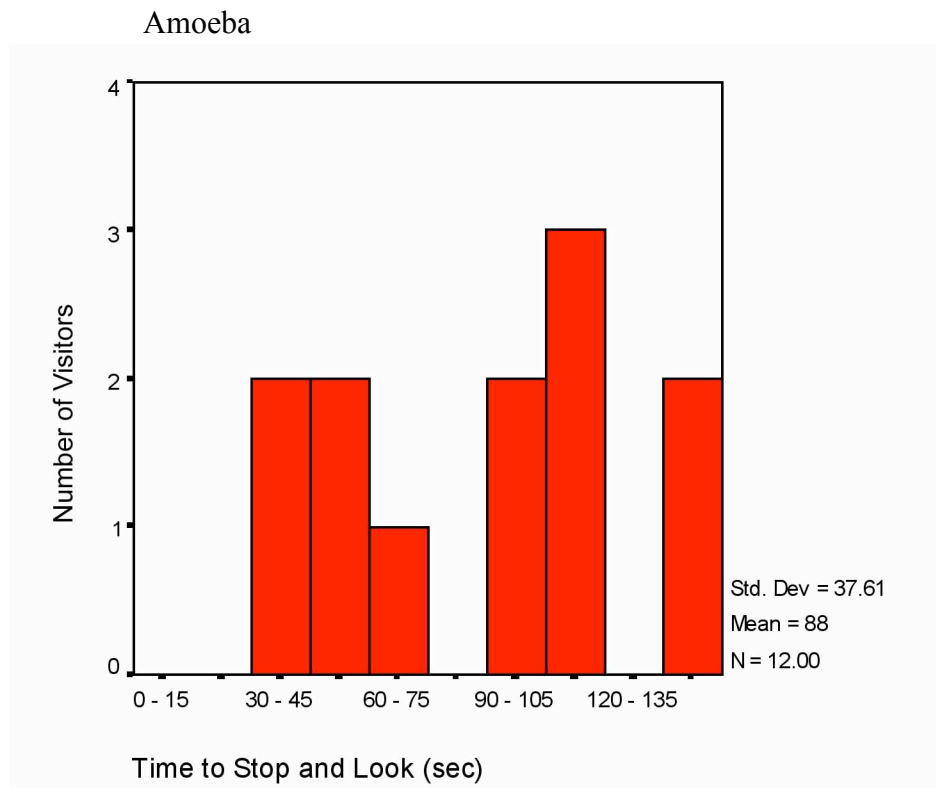
- the time it took for visitors to bring a specimen within view on the monitor.
- the time from when visitors first started searching to when they stopped moving for at least 3 seconds with a specimen in view.
- the time between when visitors first encountered a specimen to when they stopped (for more than 3 seconds) to look at a specimen.

These figures can be used as a baseline for future comparisons.

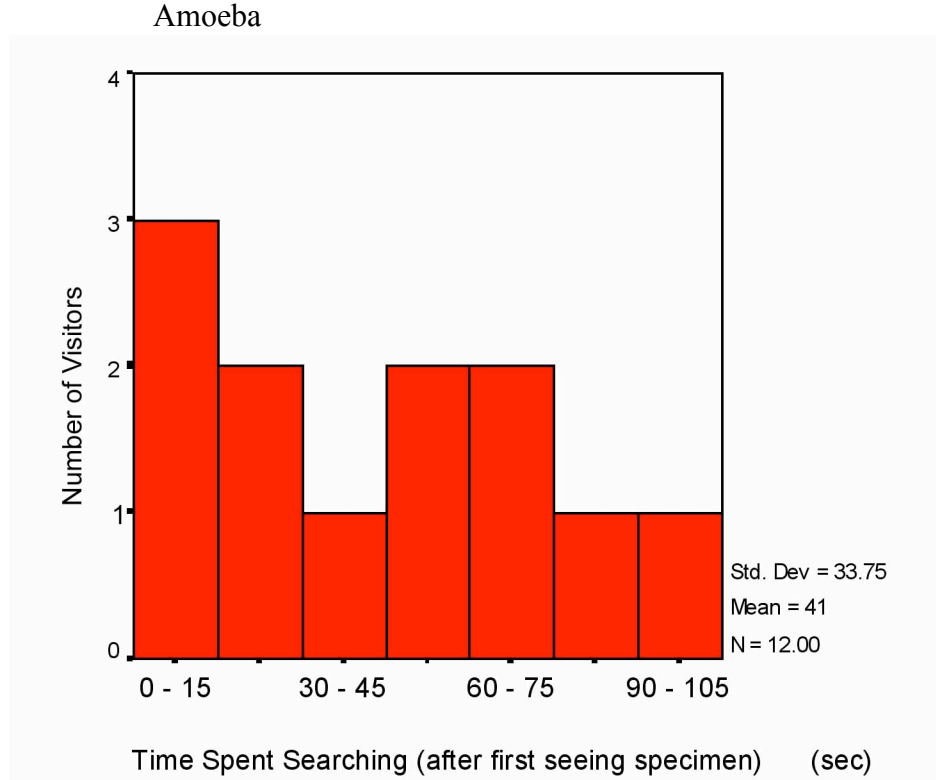
- Specimen: Amoeba
 - Time for visitors (N=12) to bring specimen into view on the monitor
 - Mean: 47 seconds
 - Median: 36 seconds
 - Range: 6 seconds to 109 seconds
 - 9/12 (75%) visitors took more than 15 seconds to bring a specimen within view
 - 7/12 (58%) visitors took more than 30 seconds to bring a specimen within view
 - 4/12 (33%) visitors took more than 1 minute to bring a specimen within view



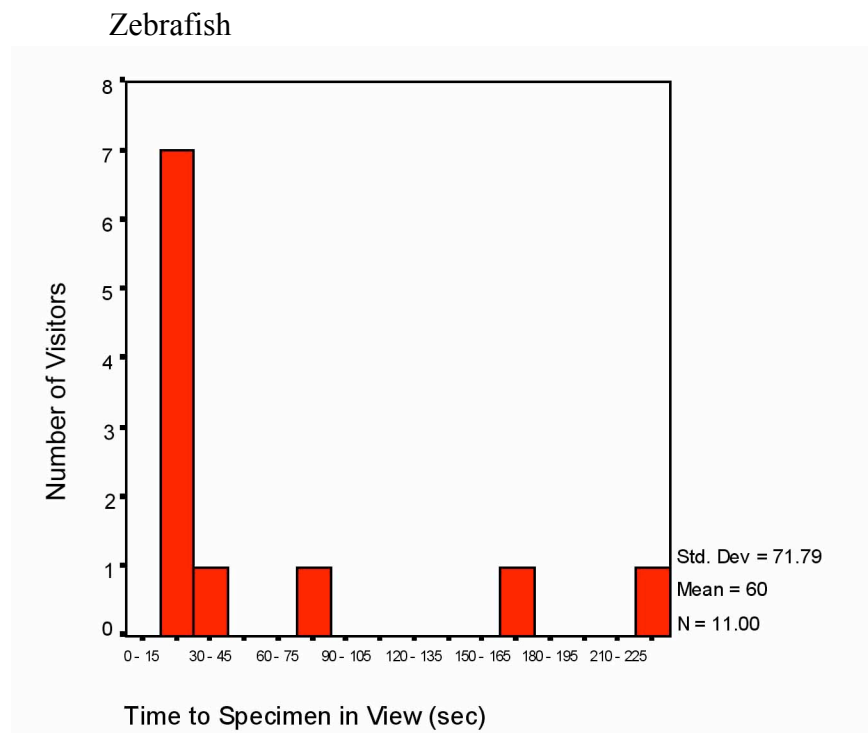
- Time to when visitors (N=12) stop for more than 3 seconds on a specimen
 - o Mean: 88 seconds
 - o Median: 95 seconds
 - o Range: 33 seconds to 141 seconds
 - o 8/12 (67%) visitors took more than 1 minute before stopping and looking (for more than 3 seconds) at a specimen they found
 - o 6/12 (50%) visitors took more than 1.5 minutes before stopping and looking (for more than 3 seconds) at a specimen they found
 - o 2/12 (17%) visitors took more than 2 minutes before stopping and looking (for more than 3 seconds) at a specimen they found



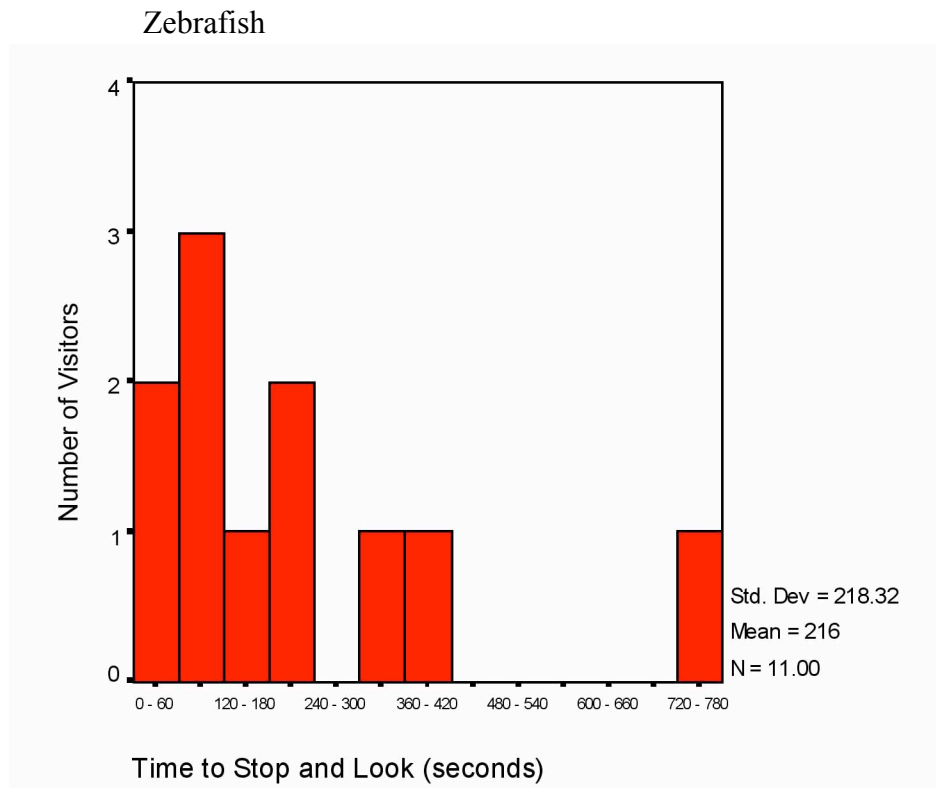
- Time visitors (N=12) spend searching for a specimen (after first encountering one) before stopping and looking at a specimen
 - o Mean: 41 seconds
 - o Median: 43 seconds
 - o Range: 0 seconds to 102 seconds
 - o 2/12 (16%) visitors stopped and looked at the first specimen they found
 - o 7/12 (58%) visitors took more than 30 more seconds searching before stopping at a specimen
 - o 4/12 (33%) visitors took more than 1 more minute searching before stopping at a specimen



- Specimen: Zebrafish
 - Time for visitors (N=11) to bring specimen into view on the monitor
 - Mean: 60 seconds
 - Median: 24 seconds
 - Range: 15 seconds to 227 seconds
 - 11/11 (100%) visitors took more than 15 seconds to bring a specimen within view
 - 4/11 (36%) visitors took more than 30 seconds to bring a specimen within view
 - 3/11 (27%) visitors took more than 1 minute to bring a specimen within view

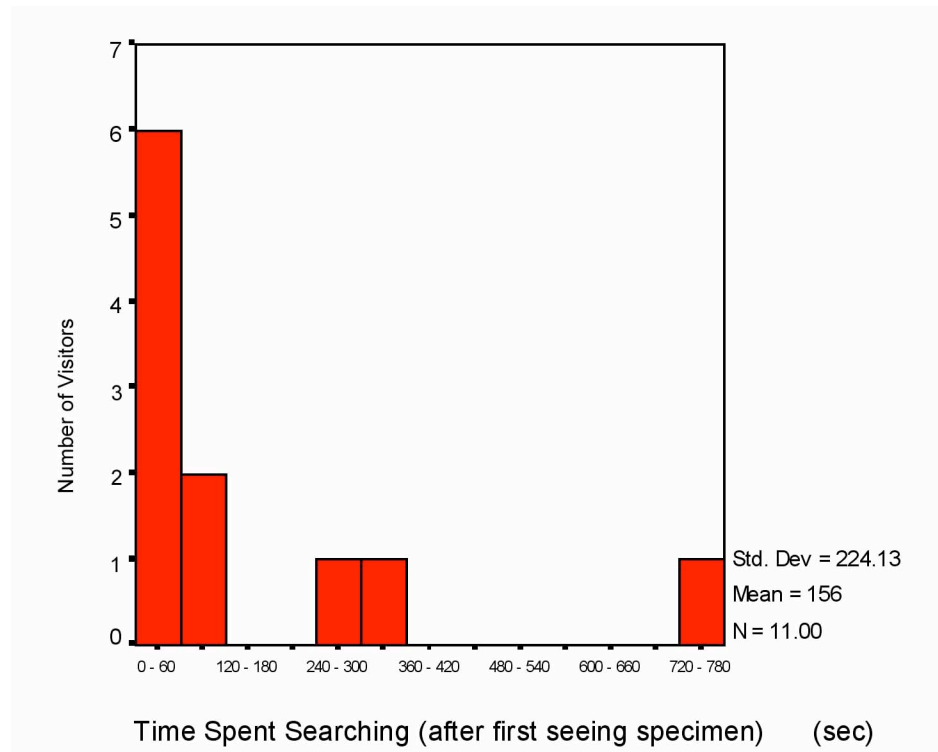


- Time to when visitors (N=11) stop for more than 3 seconds on a specimen
 - o Mean: 216 seconds
 - o Median: 126 seconds
 - o Range: 35 seconds to 772 seconds
 - o 9/11 (82%) visitors took more than 1 minute before stopping and looking (for more than 3 seconds) at a specimen they found
 - o 7/11 (64%) visitors took more than 1.5 minutes before stopping and looking (for more than 3 seconds) at a specimen they found
 - o 6/11 (55%) visitors took more than 2 minutes before stopping and looking (for more than 3 seconds) at a specimen they found



- Time visitors (N=11) spend searching for a specimen (after first encountering one) before stopping and looking at a specimen
 - o Mean: 156 seconds
 - o Median: 59 seconds
 - o Range: 0 seconds to 743 seconds
 - o 2/11 (18%) visitors stopped and looked at the first specimen they found
 - o 8/11 (72%) visitors took more than 30 more seconds searching before stopping at a specimen
 - o 5/11 (45%) visitors took more than 1 more minute searching before stopping at a specimen

Zebrafish



How easy was it to use the interface? Visitors' Assessment

As part of the interview, we asked the visitors how difficult it was to find something to look at. For both specimens, most visitors found the visitor interface easy or somewhat easy to use.

Specimen: Amoeba

Difficulty Rating	count
Easy	5
Somewhat easy	4
Neutral	1
Somewhat difficult	2
Difficult	0

Specimen: Zebrafish

Difficulty Rating	count
Easy	4
Somewhat easy	4
Neutral	3
Somewhat difficult	0
Difficult	0

What difficulties did visitors have with the interface?

Visitors mentioned the following difficulties using the interface:

Difficulty	<i>Specimen: Amoeba</i> Count (out of 12)	<i>Specimen: Zebrafish</i> Count (out of 11)
<ul style="list-style-type: none"> The xy controls were backwards. For example, these visitors believed that the right button should <i>move the specimen</i> right and <i>not scroll the image</i> right. 	6	7
<ul style="list-style-type: none"> They had problems focusing. This includes confusion about how to use the focusing buttons, whether to hold down the button to focus or to tap the button to focus by increments. (The implementation used in this test required visitors to tap the focus buttons to move the z-position by a preset increment.) 	1	2
<ul style="list-style-type: none"> They wanted a zoom feature that was not available 	1	1
<ul style="list-style-type: none"> The focus increments were too small 	0	2

Content

How interested were visitors in finding and viewing the specimens?

We asked visitors how interested they were in finding and viewing the specimens.

Specimen: Amoeba

Interest Level	count
interesting	2
somewhat interesting	3
neutral	4
somewhat not interesting	3
not interesting	0

Specimen: Zebrafish

Interest Level	count
interesting	7
somewhat interesting	2
neutral	1
somewhat not interesting	1
not interesting	0

Some visitors found the experience interesting for the following reasons:

Why finding and viewing the specimen were interesting	<i>Specimen: Amoeba</i> Count (out of 12)	<i>Specimen: Zebrafish</i> Count (out of 11)
• The specimen was moving.	4	2
• The specimen was alive	1	4
• They enjoyed the interactivity, having the controls to find and look at a specimen	3	2
• They liked seeing something close-up	2	3
• It was a novel experience	2	2
• The specimen itself was interesting to look at	1	1

Some visitors thought the experience was not interesting because:

Why finding and viewing the specimen were NOT interesting	<i>Specimen: Amoeba</i> Count (out of 12)	<i>Specimen: Zebrafish</i> Count (out of 11)
• There was no information about what they were seeing on the monitor or what they were looking for.	3	1
• There weren't enough details or recognizable parts in what they saw.	2	0
• There was little variety in what they saw to keep their attention	2	0
• The colors were unappealing	0	1

What questions do visitors ask about the specimens?

To better inform content development, we also asked visitors what they would like to know about what they saw on the monitor. These questions can inform content development.

- Amoeba
 - What is it?
 - What is the big glob here? And, what are the things that swim around?
 - What is the relationship between the different organisms on the slide?
 - What kind of behavior we can expect to see?
 - How does it move?
 - What are the different parts inside the organism that we see here?
 - How can you see it with the microscope?
 - What's the magnification?

- Zebrafish
 - What is it?
 - Is that the heart?
 - How small is it?
 - How do you get it to show on the screen here from the microscope?
 - How do they stay alive on the slide? Is that enough room there for the fish and embryo?

SUMMARY AND NEXT STEPS

Usability

- Most visitors took more than 15 seconds to encounter their first specimen, either the amoeba or the zebrafish. We should take a closer look at visitor behavior with a stand-alone version to determine if visitors stay long enough to encounter a specimen before they abandon the exhibit. If they do not, we may want to use denser slides or redesign the interface to give visitors more guidance in simply locating a specimen.

- For both specimens, most visitors continued to search the slide after encountering their first specimen. Many of these visitors searched for more than an additional 30 seconds before stopping and looking (for more than 3 seconds) at a specimen. This may indicate confusion about what they see; that is, they may not recognize the specimen as something they want to stop and look at. Or, visitors may simply want to first explore the terrain before settling down on one thing to watch. As a next step, we can experiment with different interpretative elements (e.g., pictures of the specimens) to see if they may encourage visitors to stop and look closely at a specimen instead of passing it by.

- Visitors identified a list of difficulties they had with the interface. Their comments suggest the following redesigns:
 - Experiment with reversing the xy controls to see if visitors are more comfortable with directional controls that correspond to moving the specimen instead of scrolling the viewing field.
 - Associate different focus increments to different magnifications. At the lower magnification, which was used for the zebrafish, some visitors either became frustrated with the small increments, or could not even tell that they were changing the focus when they pressed the focus buttons.
 - We should experiment with a focus *knob*. Currently, visitors have trouble with the focus buttons, deciding if they need to hold the buttons down to bring something into focus or to tap the buttons repeatedly to increase/decrease the focus plane by increments.

Content

- Visitors were interest in watching live, moving specimens.
- Visitors appreciated having control of finding and watching the specimens.
- However, some visitors were not satisfied with the experience because there were no explanations about what they were seeing. This points to the importance of creating and experimenting with different content material to help visitors make sense of what they see and give visitors a more rewarding experience in finding and watching these specimens. This report gives a list of the questions visitors asked about what they saw, which may be helpful in developing content.

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