

Axiovert Standalone Specimen - Blood

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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 **Axiovert Standalone Specimen: Blood**

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PURPOSE

This study looks at visitors' experiences at the standalone Axiovert station showing blood cells. In particular, it compares visitor interest and behavior with a largely static specimen with the more dynamic specimens (zebrafish embryo, sea urchin embryo/larvae, and amoeba) used in previous studies. Measures used include:

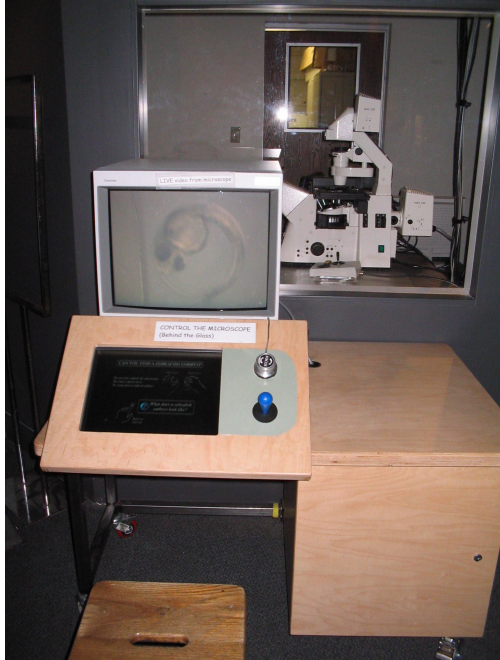
- holding time
- percentage of time spent looking at the media piece
- depth of media content
- self-reported interest
- percentage of visitors who thought the image was live as opposed to pre-recorded

In addition, we report what visitors reported seeing and questions they had about the exhibit.

The results of this study will help the Imaging Station Team decide whether or not to pursue using static specimens at the standalone exhibit.

SETUP

Figure 1. Stand-alone exhibit setup



Details of the setup can be found in Appendix A.

METHOD

- Observations:
 - Two video cameras were used to record visitor interactions. The first was set up to record what visitors were looking at on the main monitor taking the video feed from the microscope. The second was mounted outside to record visitor behavior and conversation.
 - A tracking program was used to log what media screens visitors were looking at on the media piece.
 - The above data types were then coordinated based on a common clock, to determine what a visitor did and saw at the standalone.
- Uncued Interviews
 - When possible, a visitor who had just used the standalone was then approached and asked a series of questions about the experience and about what s/he saw. These questions are in Appendix B. We selected visitors to interview based on age (must be 8 or above) and holding time (must be longer than 15 seconds).

DATA COLLECTED

- Times. Data were collected during these days:

Day	Date
Friday	10/3/03
Saturday	10/18/03

- Demographics

Gender	Count
Male	48
Female	33
Total	81

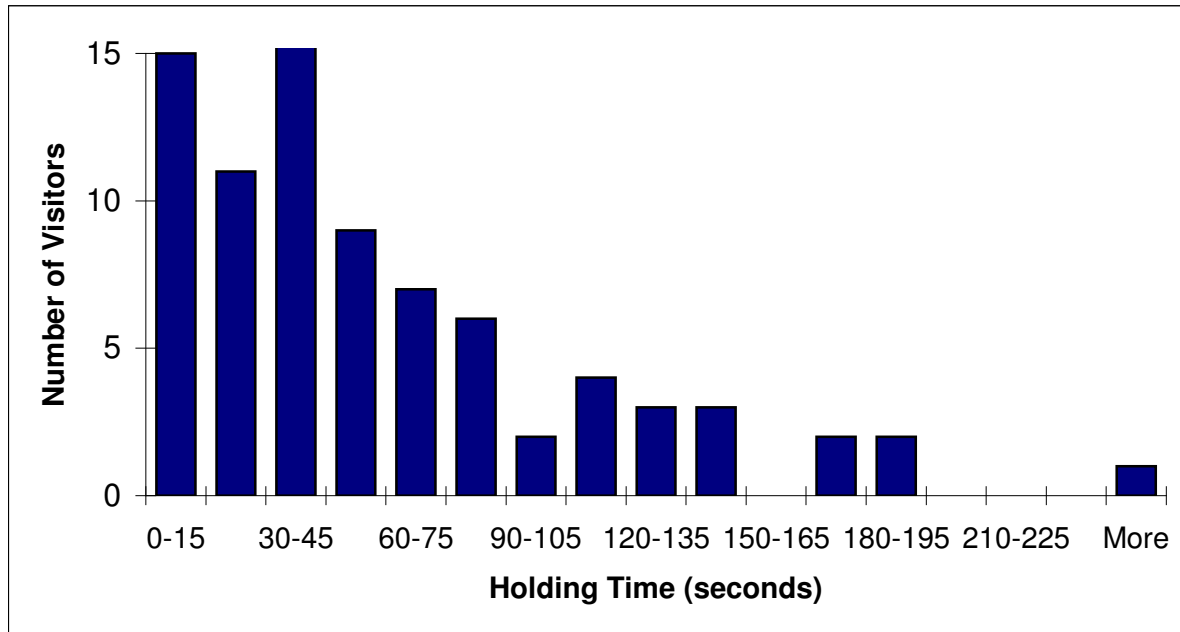
Age Group	Count
Under 8	15
Child	15
Teen	4
Adult	47
Total	81

FINDINGS

Holding time

- Figure 2 shows the histogram of how long visitors stayed

Figure 2. Histogram of the holding time for the standalone exhibit with blood. N=81. Mean = 60 seconds. Median = 45 seconds. Maximum time =273 seconds.



- Table 1 shows the holding time for each age group. There is no significant difference between age groups; $F(3,77) = .458$; $p=.713 > .05$.¹

Table 1. Holding time according to age group

Age Group	Mean Holding Time	Median Holding Time	Maximum Holding Time
Adult	70 seconds	48 seconds	273 seconds
Teen	50 seconds	33 seconds	115 seconds
Child	44 seconds	43 seconds	80 seconds
Child under 8	49 seconds	46 seconds	144 seconds

¹ Calculations were performed on the ln-transform of the holding time data. The ln-transformed data passed the Kolmogorov-Smirnov Test to assess normal distribution.

- There is no detectable statistical difference between gender groups¹; $t(79) = -.262$, $p = .794505 > .05$.
- Comparison with other Specimens

	N	Mean (seconds)	Median (seconds)	Maximum (seconds)
Blood	81	60	45	272
Zebrafish	54	104	90	416
Amoeba	59	100	81	363
Urchin	73	70	55	272

- Blood had the lowest holding time.
- However, there was no significant difference in holding times across the 4 specimens; ANOVA, $F(3,263) = 1.310$, $p = .271 > .05$

Media

- 72% (58/81) visitors looked at the media piece. 30% looked at only one screen, and 60% looked at 2 or less screens.
- Visitors (N=81) spent 17 seconds (mean) or 4 seconds (median) looking at the media monitor. The maximum time a visitor spent was 115 seconds.
- On the average, visitors spent 21% (median) of their total time looking at the media piece. The most a visitor spent on the media piece was 76% of his time.
- Comparison with other specimens

	N	Mean (seconds)	Median (seconds)	Maximum (seconds)	Mean (percentage total time)	Median (percentage total time)
Blood	81	17	4	115	21%	14%
Zebrafish	54	28	11.5	136	23%	19%
Amoeba	59	29	13	177	21%	17%
Urchin	73	14	9	66	21%	16%

- There was no significant difference between the percentage of time visitors spent looking at the media piece among the four specimens; Kruskal-Wallis test, $\chi^2 = .480$, $df=3$, $p=.923 > .05$.

What visitors thought (results of the uncued interviews, N=16)Visitors' Interest

- Most visitors found the exhibit *interesting* or *somewhat interesting*.

Interest Rating	Count (out of 16)
Interesting	7
Somewhat Interesting	8
Neutral	1
Somewhat Not Interesting	0
Not Interesting	0

- Visitors found the exhibit interesting because
 - they saw blood cells (7/16)
 - they saw something that is their bodies (3/16)
 - they saw cells (3/16)
 - they were able to use a microscope (2/16)
 - they saw something live and small (1/16)
- Two visitors (out of 16) thought it was hard to tell the difference between desiccated red blood cells and white blood cells.
- Comparison with other specimens

Interest Rating	Zebrafish (out of 17 visitors)	Amoeba (out of 18 visitors)	Urchin (out of 20 visitors)	Blood (out of 16 visitors)
Interesting	11 (65%)	8 (44%)	7 (35%)	7 (44%)
Somewhat Interesting	5 (29%)	5 (28%)	12 (60%)	8 (50%)
Neutral	1 (6%)	4 (22%)	1 (5%)	1 (6%)
Somewhat Not Interesting	0 (0%)	1 (6%)	0 (0%)	0 (0%)
Not Interesting	0 (0%)	0 (0%)	0 (0%)	0 (0%)

- There was no detectable difference between the 4 types of specimens.²

² We ran Fisher's Exact Tests, forming one outcome category from *Interesting* and *Somewhat Interesting* and the second outcome category from the other three interest ratings; $\chi^2 = 4.58$, $df=3$, $p=.205 > .05$. We also ran Fisher's Exact Tests forming one category from *Interesting* and the second outcome category from the other 4 interest ratings; $\chi^2 = 3.36$, $df=3$, $p=.339 > .05$

Whether or not visitors thought the image was live

- All the visitors interviewed thought they were watching a live image. Therefore, having a more static specimen did not diminish visitors' perception that the image was live.

Visitors' Questions

We looked at the kinds of questions visitors still had after their experience. And, we categorized visitors' questions into 3 types:

- No questions. 9/16 Visitors did not have any questions about the exhibit or what they saw.
- Questions that asked for clarification of information presented in the media piece, specifically help in identifying the different types of cells.

Visitor: if I correctly identified the white blood cells. There were lots of cells that looked like white blood cells, but I didn't think they were so numerous compared to red blood cells.

Visitor: It took a while before we figured out what the small spiky ones were, the dehydrated red blood cells

- Questions not answered in the media piece. Visitors wanted to know:

Visitor: maybe you can focus on something else? Get plant cells as well.

Visitor: Was there anything in there that the white blood cells would chase and destroy?

What visitors remember seeing on the viewing monitor

As part of their interviews, visitors were asked to draw or describe whatever they remembered seeing on the main viewing monitor.

Shape Drawn	Id shape as (out of 15 visitors ³)				
	-- (not identified)	Blood cells	Red blood cells	Desiccate Red blood cells	White blood cells
Dots	1	1	1		1
Round with smooth edge		1	2		1 (misidentified)
Round with indentation		1	4		
Round with jagged edge		2	1	3	3 (misidentified)
Blob					3

³ One visitor who was interviewed did not draw.

- Visitors' drawings show that 6/15, about one-third of the visitors, did not distinguish between red and white blood cells.
- 4/15 visitors misidentified red blood cells (particularly desiccated red blood cells) as white blood cells.
- The above two results suggest that visitors need more support in distinguishing the different types of blood cells we show. This is echoed by the questions and comments visitors had asking for better clarification on this point.
- In addition, 5/15 visitors reported seeing the cells move.

SUMMARY

- The holding time for this exhibit prototype is about 1:00 (mean). There was no significant difference between the static image of blood and the more dynamic specimens, zebrafish, urchin, and amoeba that were studied previously. This result suggests that static specimens can have similar appeal to moving specimens.
- Close to 3 quarters of the visitors looked at the media monitor. There was, however, no difference in the percentage of time visitors spent looking at the media compared to the media for other specimens.
- Most of the visitors interviewed rated the exhibit *interesting* or *somewhat interesting*. The most popular reason visitors gave for the appeal of the exhibit was the specimen: they got a chance to see blood cells. This and previous finding indicates that even if the image that are largely static can find appeal.
- Most visitors interviewed were able to draw the shapes they saw. However, about one-third of the visitors did not distinguish between red and white blood cells. And, nearly another one-third misidentified red blood cells (particularly desiccated red blood cells) as white blood cells. This indicates that visitors need more help in identifying and distinguishing between the different types of blood cells they see.

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APPENDIX A

Equipment used for stand-alone

- Axiovert200M
- MCU28
- Display
 - Optronics DEI750D
 - Sony Trinitron 19inch CRT monitor
- Metamorph version 5.0
- Game pad control: joystick2002_11_21_limits_scaled
- Interactive Media (on touch screen) : blood_V02 Projector

Setup

- Magnification 40x

APPENDIX B

Interview Questions

1. How interesting would you say that was? Would you say that exhibit was ...

Uninteresting	Somewhat Uninteresting	Neutral	Somewhat Interesting	Interesting
1	2	3	4	5

2. What made it _____ for you?

3. Did you have any trouble using the exhibit? What?

4. Do you have any questions about what you saw? What would you like to know about what you saw at that exhibit?

5. When you were playing with this exhibit, did you think that what you saw on the monitor was live or pre-recorded (for example, from a video tape)?

LIVE *PRE-RECORDED*

6. [Only if they said it's LIVE] Where do you think the living things that you saw are?

7. Did you see this [show photo of setup and gesture to area behind the glass]? *YES* *NO*

Do you believe there is any relationship between this [point to microscope on photo], this [point to main screen on photo] and this [point to media monitor on photo]? [For example, does this have anything to do with that in any way?] *YES* *NO*

How do you think they are related?

8. We're interested in how memorable this exhibit is. Could you draw for me a quick sketch of whatever you remember seeing on the main monitor [the big one right in front of the joystick]? (Probes: Just draw whatever you remember seeing, as if you were showing a little kid what you saw.)

Great, and can you tell me what your drawing shows? I just want to be sure I understand it. Like, what's this here? And this?

Can you tell me what the different parts are?

Is there anything else you remember seeing that you thought was too hard to draw or you decided not to draw?

Did you see anything happening?