

Prototype Media Piece for the Zebrafish – Activities and Personal Connections

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April 2004

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
**Prototype Media Piece for the Zebrafish – Activities and
Personal Connections**

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PURPOSE

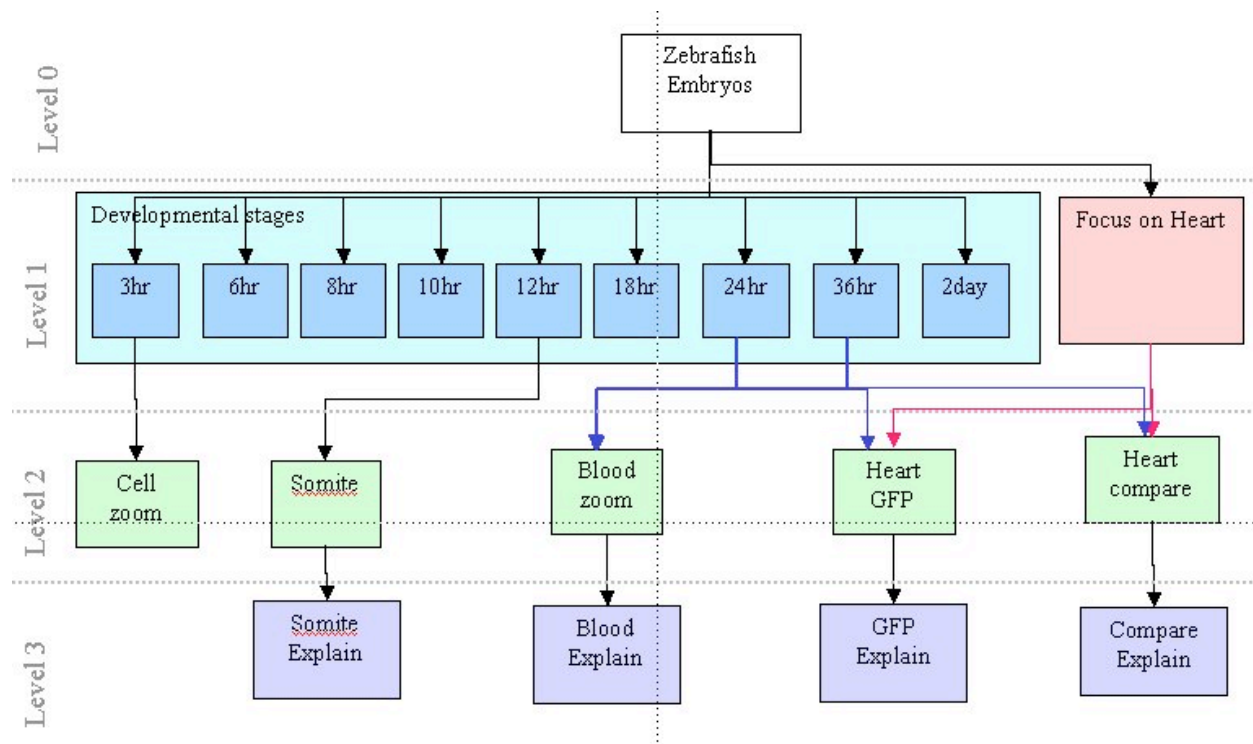
This study was conducted to:

- determine if visitors see and do the activities described in the media piece,
- identify if visitors find the activities interesting, difficult or confusing, and
- gauge if visitors make connections between zebrafish and human beings.

MEDIA PROTOTYPE

- The media prototype, zFishv10.dir, was used in this evaluation.
- Figure 1 shows the map of the media screens used

Figure 1. Media Map



METHOD

- Observations:
 - An evaluator sat 10 feet away from the stand-alone station and observed visitors as they used the exhibit. If visitors came in a group, the first visitor to stop was observed. The evaluator noted when a visitor stopped at the exhibit, when s/he looked at the main monitor, the media monitor, and the microscope, and when that visitor left the exhibit. Demographic information was also noted.
 - A tracking program logged what media screens visitors were looking at on the media piece.
 - The clocks used by the evaluator and the tracking software were synchronized to each other before each day's observation. This allowed us to coordinate our floor observations with the computer log to determine what each observed visitor did and saw with the media piece.
- Uncued Interviews
 - When possible, a visitor whom we just watched was then approached and asked a series of questions about the media piece. These questions are in Appendix A. We selected visitors to interview based on age (must be 8 or above) and holding time (must be longer than 15 seconds).

PARTICIPANTS

- Observations
 - N = 42

Gender	Count
Male	23
Female	18
Total	41 ¹

Age Group	Count
Under 8	2
Kid	3
Teen	8
Adult	25
Senior	3
Total	41 ¹

- Uncued Interviews
 - N= 20

Gender	Count
Male	10
Female	9
Total	19 ²

Age Group	Count
Under 8	0
Kid	2
Teen	5
Adult	10
Senior	2
Total	19 ²

¹ Demographic information is missing from one of the observations

² Demographic information is missing from one of the interviews.

Group Type	Count
Individuals	6
Under 8	0
Child	0
Teen	4
Adult	2
Groups	13
Adult	6
Family	7
Total	19 ³

FINDINGS

Media Screens

What screens did visitors look at?

- 35 out of the 42 (81%) visitors we observed looked at the media screen
- The following shows which screens those 35 visitors stopped at.

Level	Count (out of 35)		Screen	Count (out of 35)
Level 0 (Start)	20 (57%)		Zebrafish Embryos	21
Level 1	29 (83%)	Development Stages 17 (49%)	3 hour embryo	5
			6 hour embryo	2
			8 hour embryo	0
			10 hour embryo	1
			12 hour embryo	1
			18 hour embryo	5
			24 hour embryo	1
			36 hour embryo	4
		3 day embryo	8	
		Finding Heart 16 (46%)	Focus on heart	16

³ Demographic information was not collected for one of the visitors interviewed.

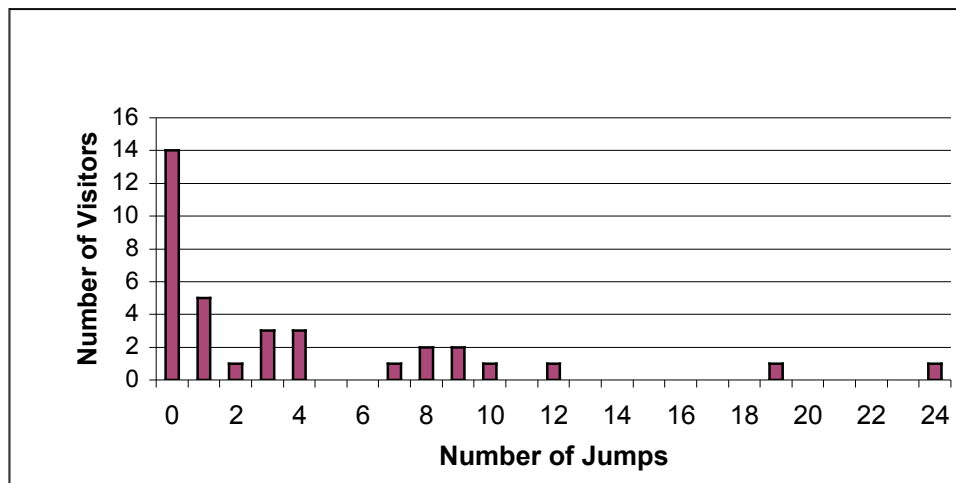
Level	Count (out of 35)	Screen	Count (out of 35)
Level 2 (Activities)	14 (40%)	Cell Zoom	3
		Somite Activity	0
		Blood zoom	4
		Heart compare	5
		Heart GFP	7
Level 3 (Explanations)	5 (14%)	Somite Explain	0
		Blood explain	0
		Compare explain	3
		GFP Explain	2

- Less than half of the visitors reached a focused activity screen.
- A small minority looked at an explanation (level 3) screen.
- There is no significant difference between the number of visitors who saw the “Focus on Heart” screen, which was designed to be more activity directed, and a development stage screen, which focused more on identification.

How did visitors navigate the media piece?

- Figure 2 shows the histogram of the number of jumps visitors made with the touchscreen.
 - 21 out of 35 (60%) visitors used the touchscreen to jump to another page.
 - On the average, visitors made 1 jump (median) and 3.8 jumps (mean). The maximum number of jumps a visitor made was 24.

Figure 2. Histogram of number of jumps visitors made with the media piece



- Next, we looked specifically at how visitors reached the “Heart GFP” and “Heart Comparison” activity screens; these are two screens that are accessible from “Focus on Heart”. We found no difference in the percentage of visitors who reached these focused activity screens through either the “Focus on Heart” or the 24-Hour and 36-Hour development stage screens⁴. (Fisher’s Exact Test, $p=.61 > .05$). Either emphasis – an activity-directed (the “Focus on Heart”) screen or a stage identification screen, is equally likely to lead visitors into a more focused activity in the current prototype.

From screen	To screen	Count
Focus on Heart	Heart GFP or Heart Comparison	6 out of 16
Development Stage (24hr and 36hr)	Heart GFP or Heart Comparison	3 out of 5

- A map summarizing how the 35 visitors navigated the media piece is provided in Appendix B.

Did visitors use the media to control the scope?

- 4 out of 35 (11%) visitors used the interface to change the magnification from 5x to 10x.
- 6 out of 35 (17%) visitors used the media piece to control the fluorescence.

Activities Visitors Tried

What activities did visitors describe doing at the exhibit?

The following summarizes visitors’ self-reports of what they were trying to do at the exhibit. We categorized their descriptions into those activities that are suggested by the media piece and those that are not. This is done to give some sense of which visitor activities we currently describe and support in our activity screens and which we do not.

- Activities described on the media piece
 - Look at or for the heart beating (11/20 visitors interviewed)
 - Make the fish glow (2/20 visitors interviewed)
 - Compare zebrafish to human heart (2/20 visitors interviewed)
 - Look at the blood (1/20 visitors interviewed)
- Activities not explicitly described on the media piece
 - Look around, nothing more specific (4/20 visitors interviewed)
 - Look and identify other parts (3/20 visitors interviewed)
 - Look at fish behavior (3/20 visitors interviewed)
 - Look for different stages (2/20 visitors interviewed)

⁴ These 2 screens are the only development stage screens that have access to “Heart GFP” and “Heart Comparison.”

Visitors' responses can be found in Appendix C.

How did visitors use the media piece?

To better gauge if it was the media piece that encouraged visitors to try these activities, we looked at visitors' self-reports of how they used the media piece. Visitors described using the media piece to do the following.

- Find and look at the heart (9/20 visitors interviewed)
 - And make it glow (4/20 visitors interviewed)
 - And zoomed in (1/20 visitors interviewed)
- Identify the specimen (3/20 visitors interviewed)
- Identify the stage of development (3/20 visitors interviewed)
- Change the magnification (3/20 visitors interviewed)
- Change UV light (2/20 visitors interviewed)
- Look at the blood (1/20 visitors interviewed)
- Compare the human to the zebrafish heart (3/20 visitors interviewed)
- Visitors did NOT use the media (3/20 visitors interviewed)

Did visitors find these activities interesting?

We asked visitors how interesting they found the activities suggested by the media piece and if they had any difficulties doing each of the activities they tried.

- Finding and looking at the heart
 - Most visitors found this activity to be interesting.

Interest Rating	Count (out of 9)
Interesting	6
Somewhat Interesting	1
Neutral	2
Somewhat not interesting	0
Not Interesting	0

- Visitors mentioned the following made this activity interesting
 - Visitor26: They were still alive- they were not just a dead cell - they were alive.
 - Visitor28: Yeah because you could see it [heart/blood] moving on something that small.
 - Visitor29: Something I've never seen before.

Visitor32: You get the feeling of what's going on in labs somewhere. This is actually moving and you get the feeling it's alive. Compared to looking at some dead thing it's much more fun.

Visitor37: I think the place of the heart was interesting, and how fast it was beating. I think the babies were cute. It [heart] was round.

- Using the UV

Visitor12: because when you turn on the light, you can see them glow in the dark

Visitor17: I thought it was really neat. In a sense..... I don't know how to explain it.

Visitor38: It focused on the heart- you could actually see the palpitations.

- Zooming in

Visitor43: Just being able to selectively see closer parts.

- Visitors had some difficulties with this activity:

Visitor12: I didn't find the heart. I saw something by the head that was moving, but I wasn't sure

Visitor17: the focusing. It was hard to focus on the heart. It kept moving around a lot.

Visitor28: Well, sometimes you can't see as well. The controls are a little bit shaky but it's still pretty cool.

Visitor29: no- it was almost hard to see because it was small.

Visitor32: Touchscreen [was difficult to use]

- Looking at blood

- The one visitor who looked at the blood found the activity interesting because he could "see it moving on something that small."
- This visitor reported no difficulties with the activity.

- Comparing human and zebrafish hearts

- Three visitors compared the human and zebrafish hearts. One found the activity interesting, another found it somewhat interesting, and the last found it neutral in interest. One visitor explained that she liked "just seeing how much alike and different different organisms are."
- Visitors had difficulties with this activity. They reported:

Visitor17: the screen was a little confusing. It only shows one picture, so I wasn't sure if that was the human or the fish heart

Visitor38: There was not that much info available -just a picture, not much to compare. [For heart comparison] It would have been better with more information in regards to the human heart.

- Using the UV (not with the heart)
 - Two visitors liked making the zebrafish glow. They explained

Visitor14: being able to see it glow. The whole thing in general was really interesting

Visitor41: It was more like a focused view, kinda separated the other stuff so you see just the one organ and all the things correlated with it.

- One of these visitors felt that the zebrafish moved too much, making it difficult to see.

Zebrafish – Human Connections

Did visitors see a connection between zebrafish and humans?

- Seven out of 20 (35%) visitors interviewed did not see any connection between what they saw and humans. Out of these seven, 6 did stop at a screen that described a connection between humans and zebrafish.
- A majority of visitors (65%) did see a connection. 11 out of these 13 visitors stopped at a screen that described a connection between humans and zebrafish.
- A visitor who stopped at a screen describing a human-zebrafish connection is just as likely to report thinking that there's a connection as a visitor who did not stop at such a screen; Fisher's Exact Test, $p=1.0 > .05$.

	Thought there's a connection	Did NOT think there's a connection
Saw screen with human-zebrafish connection	11	6
Did NOT see screen with human-zebrafish connection	2	1

- These are the connections visitors described:
 - The hearts and some other parts are similar (5/20 visitors interviewed).⁵

Visitor16: not really closely, but they said human heart is the same as zebrafish.

Visitor29: Yeah because they're both alive and they (fish) have eyes and hearts and everything.

Visitor32: I guess I have a heart, for instance. See some of the interior of the fish and that some of them are not exactly singular. I think the connection I felt was that this is alive.

⁵ All of these 5 visitors stopped at a screen (i.e. "Focus on Heart" or "GFP Explanation") that described a connection between humans and zebrafish, particularly the heart.

Visitor38: yeah- from a cellular perspective - it's a different size(d organism) but it's the same composition overall.

Visitor41: Yes, I thought it was kinda, the basic principle behind the hearts [fish and human] was almost the same.

- Their development is similar (4/20 visitors interviewed).⁶

Visitor14: it said something about the embryo being the same size as people. Just seeing embryo development. and the spinal column. Not sure if it's really a spinal cord, but that was cool.

Visitor28: well like the anatomy yeah, like the embryo, we learned about that in science class. In the early stages they're pretty much all the same (different species embryos), and then they spread out.

Visitor36: A little, it's developing just like humans.

Visitor37: Seeing hearts and embryos develop was like babies [same process as babies go through].

- The embryos look like human embryos (3/20 visitors interviewed)

Visitor6: not that I can say. The ones that were inside the eggs still. They reminded me of the ultrasound picture of my son when my wife was pregnant. That's about as much connection as I can think of.

Visitor17: it's like seeing my mom's, when I saw my mom's ultrasound. [anything else that reminded you of human beings in general?] No

Visitor43: some- all the embryos (of species) are so similar.

- Both are living (1/20 visitors interviewed)

Visitor15: not particularly. Its biology, so it's all related somehow I'm sure.

- It is unclear if the media helped visitors make these connections or whether they are able to make these connections independent of what they saw on the media piece.

SUMMARY

- 35 out of the 42 (81%) visitors we observed looked at the media screen.
- Most (82%) of the visitors who looked at the media screen reached a Level 1 screen (1 jump from the start screen). 40% of the visitors reached a Level 2 screen that gave detailed description of an activity to try, and a small minority (14%) stopped at an activity explanation screen, Level 3. This suggests that we should place the more critical messages (e.g. personal connection) at the higher levels in the media hierarchy to increase the chance of exposure.
- The current prototype experimented with an activity-directed screen (i.e. "Focus on Heart") to see if this may help visitors reach the more detailed activities (e.g. "Heart GFP") more easily. We did not find any strong indications that it did. That is,

⁶ Two of these four visitors never stopped at a screen describing a particular developmental stage, which noted similarities between human and zebrafish development.

- Visitors did not seem to have a strong preference for the activity-directed screen over the developmental stage screens. That is, we found no difference in the percentage of visitors who stopped at the “Focus on Heart” screen (46%) compared to percentage that stopped at a developmental stages screen (49%).
- Furthermore, the more activity-directed, “Focus on Heart,” screen did not seem to encourage visitors to explore the media activities (on Level 3) any more than the developmental stage screens.
- Interviews indicate the media piece did prompt some visitors (45%) to find and look at the heart, although a smaller percentage of visitors went on to do the more focused activities (e.g. make the heart glow, compare hearts and zoom in on blood) described in the next media level.

At the same time, there was nothing to indicate that using such a screen detracted from the visitors’ ability to navigate to the more focused activities described in the media piece.

- A majority of visitors (65%) did see a connection between the zebrafish and human beings. However, it is unclear if and how the media helped them make this connection. We may wish to experiment with the placement of human connection information on screens that visitors stopped at more frequently, to see if we can better communicate this message.

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APPENDIX A

Questions

1. Can you tell me what you tried to do at the exhibit?
2. Did you get a chance to look at the touchscreen? That's the monitor under the main viewing monitor.

YES

NO

3. [If YES to 2] Can you tell me some of the things you remember seeing or doing on the touchscreen? [Probe hard to see if they tried any of the activities: Did you try any of the activities suggested on the touchscreen?]
4. [If they mentioned an activity: zoom in on blood, zoom in on cells, make heart glow, compare to human embryo, compare to human heart]

- a. Was that interesting to you? Was it

Uninteresting

Somewhat
Uninteresting

Neutral

Somewhat
Interesting

Interesting

1

2

3

4

5

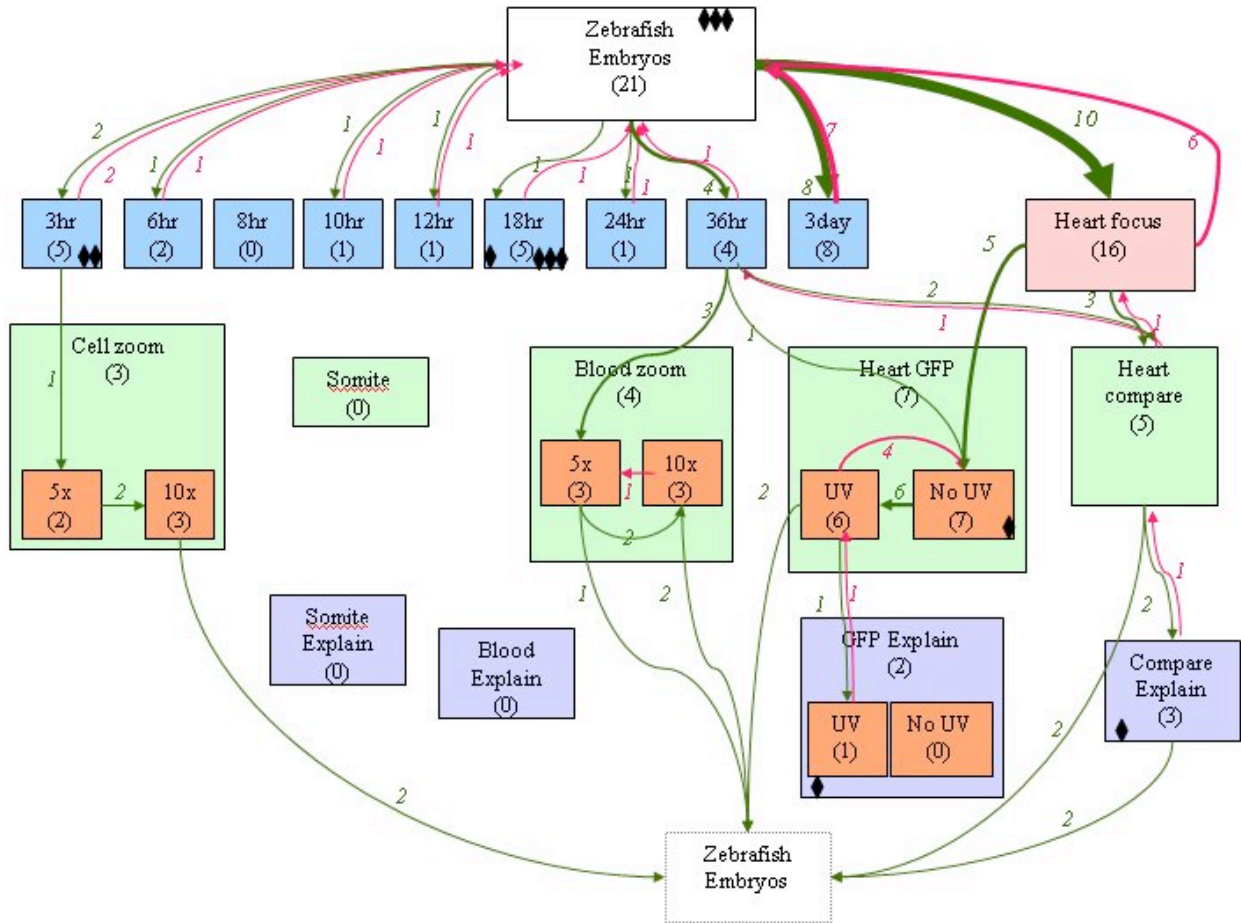
- b. Can you tell me what made that interesting to you?
- c. Was there anything difficult about doing xxx?
- d. Was there anything confusing about xxx?

[Repeat for each activity they mentioned.]

5. Did you feel there's any connection between what you saw on the main monitor and human beings?
6. Did you feel that there's any connection between what you saw and yourself?

APPENDIX B

Visitors' Paths Through the Media Piece



A black diamond indicates a person who did not jump to another screen.

APPENDIX C

Visitor's responses : What activities did visitors describe doing at the exhibit?

- Activities suggested on the media piece
 - Look at the heart beating
 - Visitor12: Wondering what was that light for. The one for seeing the heart [the one that was green?] Yeah.
 - Visitor15: I saw the heart beating too. That was neat
 - Visitor17: I was seeing the heart pulse, just seeing which ones were alive and which were dying
 - Visitor26: I looked at the babies. And then it said try to find the beating heart. We were looking for the beating heart. There was one baby who hadn't hatched. I focused on the babies who had hatched.
 - Visitor28: Well basically, you know the questions that pop up on the page (touchscreen)? I looked for the heart and the ovals of blood.
 - Visitor29: I just moved it around. We located the heart.
 - Visitor30: We tried to look where the brain was and the heart and what they did (fish behavior).
 - Visitor36: I just tried to focus on the heart.
 - Visitor37: Show her (child) how the embryos develop. We were just observing it- looked to find the heart on some of them. It looks like a weird heart.
 - Visitor38: I basically tried everything that was on display. I tried comparing human to zebra heart- seeing it under the UV
 - Visitor43: We were just looking for the heart rate- using the microscope and looking for heart rate.
 - Make the fish glow
 - Visitor14: we tried to follow the one that was swimming around, the one that was no longer in the egg. We tried to catch it so we can use the UV on it. It was swimming too fast though.
 - Visitor38: I basically tried everything that was on display. I tried comparing human to zebra heart- seeing it under the UV
 - Compare zebrafish to human heart
 - Visitor38: I basically tried everything that was on display. I tried comparing human to zebra heart- seeing it under the UV
 - Visitor41: Just to see if it works, to see patterns of the fish heart and human heart, if they're the same.
 - Look at the blood
 - Visitor28: Well basically, you know the questions that pop up on the page (touchscreen)? I looked for the heart and the ovals of blood.

- Activities not explicitly suggested on the media piece
 - Look around, nothing more specific
 - Visitor5: move around to see what's there to look at.
 - Visitor6: didn't try anything in particular. I was just amazed by the fact that you can see the fish embryos so clearly and in so much detail. [Can you tell me what you were doing while you were looking at the fish embryos?] I moved around a little bit and focus
 - Visitor16: I was just curios about what's in there? [Can you tell me a little about what you did there?] Just looked at the zebrafish.
 - Visitor31: just looking at the embryo
 - Look and identify other parts
 - Visitor12: trying to see what was that big thing with the big tails. It's weird. Wondering what was that light for. The one for seeing the heart [the one that was green?] Yeah.
[ae] trying to figure out why they have the big stomach.
 - Visitor30: We tried to look where the brain was and the heart and what they did (fish behavior).
 - Visitor32: Tried to have a look for the fish to see what part of the fish I can recognize. Also touching and moving everything- [asking] what am I supposed to do here? - You start moving and touching before you know what you are doing in this place.
 - Look at fish behavior
 - Visitor17: just seeing how the fish were born.
 - Visitor30: We tried to look where the brain was and the heart and what they did (fish behavior).
 - Visitor35: I tried to see what they were doing, no
 - Look for different stages
 - Visitor4: we tried to look for the zebrafish. We moved around and found different ones.
 - Visitor15: look at the fish and tried to figure out which stage they were in.