

Teacher Survey

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Imaging Station – Front-End Evaluation Teacher Survey

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PURPOSE

Middle school and high school teachers participating in the Teachers' Summer Institute were invited to see the prototype of the standalone Axiovert Imaging Station with zebrafish (Figure 1), the time-lapse medley (Figure 2), and the sea urchin fertilization demo (Figure 3) currently on the floor, and were asked for their feedback. In particular, we were interested in understanding how the Imaging Station can support their teaching, and if there are images, videos or other resources we can provide them.

Figure 1. Standalone Axiovert station

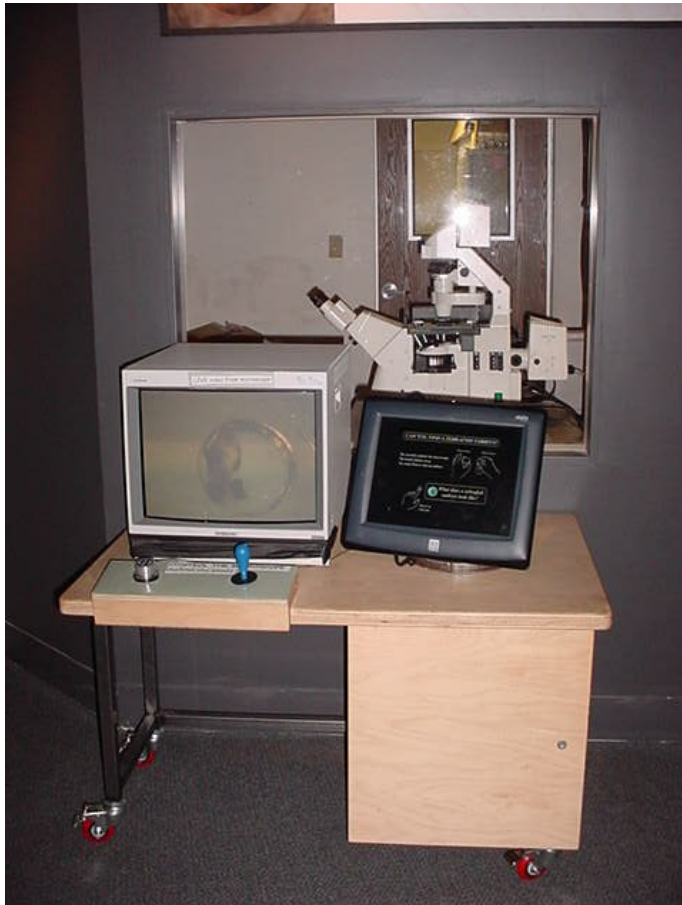


Figure 2. Time-Lapse Station

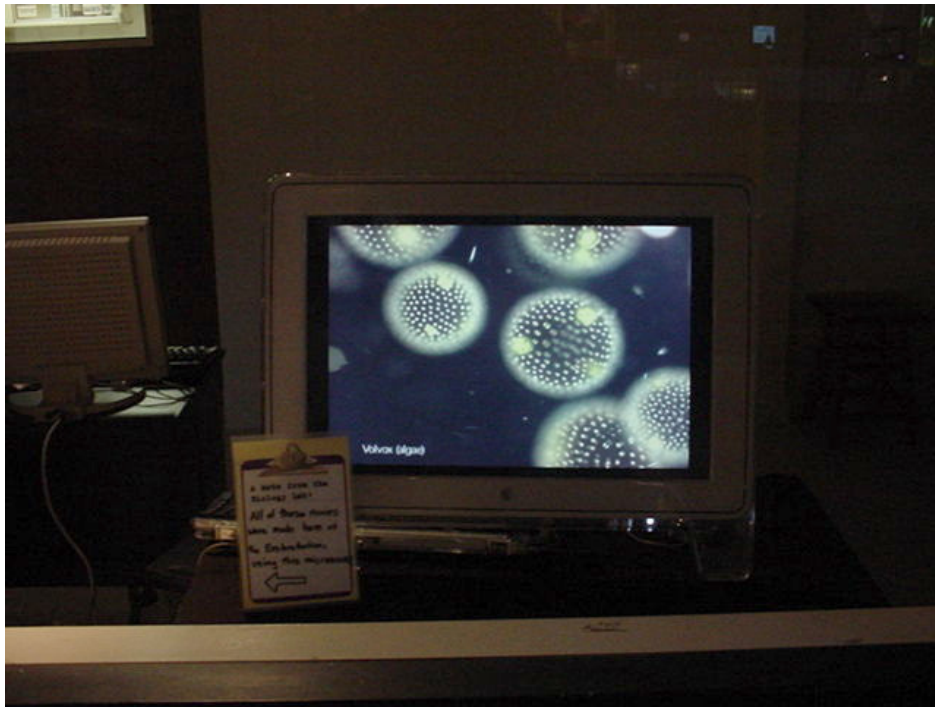


Figure 3. Demonstration Station



METHOD

We distributed survey forms to the teachers after they had looked at all three stations. The survey questions can be found in Appendix A. They were encouraged to return their completed forms to Karen Kalamut at their convenience.

DATA COLLECTED

- Middle School Teachers, N=16
- High School Teachers, N = 9
- Total, N = 25

RESULTS

The results of the survey are summarized below. Where appropriate, we include quotes from the teachers to better illustrate a type of response.

Time Lapse Video

Have you used time-lapse video in your teaching for biology (e.g., to show cellular events, development, other microscopic processes)?

	Middle School Teachers	High School Teachers	Total
Yes	8	6	14
No	8	3	11

What has been successful?

- Showing DYNAMIC processes
 - Controlling playback for instruction (2)
 - Being able to show the segment several times, often focusing on a different event each time.
 - The ability to pause the video and discuss certain features. Assists students with understanding process
 - Particular Processes
 - Development (4), including
 - Showing the different stages of development.
 - Documentary style videos of human egg development.
 - Mitosis/Meiosis (4), for example
 - Great way to illustrate PROCESSES which we can't accomplish easily IN-class (for mitosis).

- Students see meiosis/mitosis in motion (vs. in a textbook) & it captures their attention.
- Growth and decay (1)
 - Showing both the growth of plants, decay, dead animals being devoured.
- Others Processes (1)
 - In physics, a bullet passing through various objects (i.e. an apple, metal, glass)
- Showing particular specimens
 - Protozoa (1)
 - Fruit flies (1)

What difficulties have you had in using time-lapse in your teaching?

- Students/Teachers need more control over the playback (4)
 - I know when I've looked at it myself... there have been technical difficulties - my worry for kids would be (that) it would go too fast and they'd miss the stages or too many using the website at once makes it go too slow.
 - Students don't have hands-on access (start, stop, individually making sure they know what they're watching) or control.
 - On video cassettes, hard (time consuming) to cue up, rewind, pause, low image quality.
 - Goes too fast over before I can explain. Constantly reviewing
- Little is available (3)
 - Availability of relevant and accessible segments.
 - Haven't used time-lapse video for lack of funding.
 - Finding good video clips.
- Time-lapse videos are of poor quality(2)
 - the quality is poor
 - at times, the images are not focused or move too quickly.
- Schools lack the equipment (1)
- Videos are too long (1)
 - If it's too long, it could be boring, attention span of students are limited.
- Need more content information with videos (1)
- Need indication of real time (1)

Why have you not used time-lapse video?

- Lack of access to time-lapse/ technology (9)

Also lack of access to these materials.

I have never seen an available site for this.

Time lapse has not been available.

Not available at my school. I myself do not know how to use, but would LOVE to learn how.

I teach in a very "poor" private urban school with little access to technology.

Mostly because it is unavailable to me. Having it web-based would be great!

Not sure. Use what I have on my video library and I am not good at finding what's on internet.

Didn't have time to research on internet to find good videos not available

- Lack of control over video playback (1)

It's difficult to pull a 10 or 15 second segment out of a video 3-6 times per day.

What types of time-lapse video would you like to use, if any, in your teaching for biology?

- Videos of Processes

- Mitosis (15)
- Embryo Development (10)
- Meiosis (8)
- Growth (plant and animal) (4)
- Fertilization (plant and animal) (2)
- Reproduction and Birth (2)
- Decay / Decomposition(2)
- Cellular processes (2)
- Osmosis (2)
- Intracellular motion (2)
- Life cycles (1)
- Tropism (1)
- Metamorphosis (1)
- Regeneration and Healing (1)
- Cloning (1)
- Human systems and processes (7)
 - Body systems (circulation, digestion).
 - white blood cell attacking bacteria,

Immune reactions,
 Immune system "events" like phagocytosis, viruses entering host cell.
 Blood flow.
 Anything involving human systems would be great.
 white blood cells engulfing food,

- Videos of Certain Specimen Types
 - Human / Animal specialized cells (5)
 - human body tissues (nerves, muscle, brain, red, white blood cells.)
 - Neuromuscular junction?? Neurons, muscle cell, fat cell (can never see just one). ...Any other specialized cell types.
 - variety of images of the different types of cells (muscle, nerve, etc), cancer cells
 - nerve cells,
 - sickle-cell vs. normal RBCS (split screen?),
 - Examples of the 5 Kingdoms (4)
 - Animals (4), including
 - Earthworms circulatory system (they got 5 hearts! How does it work?).
 - Cow's digestive system.
 - worms--e.g. parasites,
 - Bacteria (4)
 - Protozoa (3)
 - Cells (2)
 - Virus (2)
 - Plants (1)
 - Protist (1)
 - Proteins (1)
 - DNA (1)

How much content information would you like to accompany the video we provide?

- Summarized (13)
 - With pointier to additional information (9 out of the 13), for example
 - A short pamphlet for teachers sounds good. Some explanation on the video would clarify things for the student.
 - maybe activity to accompany. (printable or web-based.)
 - Minimal info ON the video, but high school level (see high school textbook or standards) "on the side."

Summaries for the students of what you are showing PLUS links to add'l information.

It would be *GREAT* to have lesson plans or links to them to go along with video.

- Detailed (4)
 - Other Comments
 - Videos need to be cataloged, indexed, and cross-referenced (1)
 - Videos should have varying levels of details (1)
- Varying levels from Basic Concepts to advanced function.

Do you currently have access to time-lapse video for biology?

	Middle School Teachers	High School Teachers	Total
Yes	7	6	13
No	9	3	12

Where do you get your time-lapse video?

- Library (7)
- Private Collection (7)
- Web (3)

How did you find this resource?

- Library (4)
- Other teacher (3)
- Catalogs (2)
- Television (1)
- Web (1)

Still Images

What types of images would you like to use that you cannot get currently?

- Images of Process

- Mitosis/ meiosis (4)
 - Development (4)
 - Human/ Animal Systems (2), such as
 - Systems in animals (ex respiratory, etc)
 - Body processes: circulatory, immune, digestive, muscle systems.
 - Cloning (2)
 - Fertilization (1)
 - Phagocytosis (1)
 - Infectious Organisms (1)
 - Growth (1)
 - Reproduction (1)
- Images of Certain Specimen Types
- Specialized human cells (9), such as
 - Blood cells,
 - muscle tissue, connective tissue (any human body tissues), red/white blood cells,
 - All cell types in humans, etc.
 - cell types (muscle, skin, nerve, etc.) Muscle contraction, cancer cells,
 - comparative anatomy of body systems,
 - Types of blood and other human cells.
 - sickle cell anemia
 - Plants (9)
 - Protist (8)
 - Animal (7)
 - Cell Organelles (4)
 - Virus (2)
 - Cells (2)

How much content information would you like to accompany the images we provide?

- Summarized (19)
 - With some information in Picture Caption (5)
 - Pointers to additional information (at or after visit) (3)
 - Background material accessible to students reading or researching independently.
 - It would be nice to have links to pages about each image.
- Detailed (5)

- Other Comments
 - Information should be school-grade Specific / Age Appropriate (4)
 - Middle School to Collegiate level information. Activities (webquest style) that lead students to the level of information that best suits their interests. Links to other sites, or information pages, etc.
 - Refer to CA state standards for 7th grade - life science. Information that highlights the important parts/processes written AT middle school reading level.

Floor Experiences with the Microscope

How can we improve the stand-alone (non-facilitated) microscope exhibit, which you saw, for your students when you visit the Exploratorium during a field trip?

- Axiovert Standalone Station
 - Show a variety of organisms (3)
 - Hmmm... maybe show other organisms as well? (though I know your microscopes are limited in #). I'm not sure, I'll get back to you. Excellent! A variety of specimens and processes would be great.
 - Indicate real- size (2)
 - Pictures of the organisms in real-size. (i.e. pond water w/amoeba "invisible, large colony of algae, "blood" separated and not, a zebrafish, sea urchin).
 - Maybe real size samples to show students how small they really are.
 - Have other activities (1)
 - Maybe make it into a quiz or game that engages student to examine different stages.
 - Instructional Preamble (2)
 - Viewing rm to briefly explain what's going on.
 - pre-activity to provide students with background information about the organisms and a student/interactive guide to be used at the exhibit
 - Allow magnification control (1)
 - Have more screens (1)
 - More monitors/screens, so more students can see at once.
 - Allow students to look into microscope (1)
 - Allow them the action of actually looking into a microscope instead of just seeing it on screen.
- Time Lapse Station

- More variety (2)
- Control (2)
 - It also would be helpful to be able to pause the time-lapse image to get a closer look.
 - the video moved too quickly to show/point out things.
- Display issues (2)
 - More screens or a single larger screen. As it is, bringing a class or even part of a class could be a challenge.
 - Some of the images we saw today (amoeba, certain worms, etc.) were too brief. Longer images (30 seconds?) would be better than the 5 second ones.
- Content description (1)
 - some text to describe what we are seeing would be helpful. (Also magnification and actual size of objects would be great.)

How can we improve or augment the demonstrations we currently have on the floor for your students on a field trip?

- Subjects for Demos
 - Genetics (8)
 - Evolution (3)
 - Development (3)
 - Human Body (3)
 - the human body, could be explored in more depth (7th grade focus), such as respiration, locomotion, digestion.
 - comparative morphology and anatomy.
 - relationship between microbes and health
 - Comparisons of different organisms (2)
 - Cell Structure (1)
 - Diseases (1)
 - Variation (1)
 - Growth (1)
 - Fertilization (1)
- Suggestion on Physical Setup (2)
 - Have a bigger area so that (for demonstrations) kids could see better and wouldn't have to crowd around a table. Perhaps an exhibit on evolution and animals (maybe you have one already, I'm not sure.)
 - More choices, the demo on the sea urchin is COOL, just more options.

– Other Comments

experimental design-the processes behind developing an exhibit-
scientific procedure

In General

What are the two most important resources we can provide you from the Imaging Station?

Resource	Count
Time-lapse	22
Still images	17
Demos	2
Lab experiments	7

- Time-lapse video: Of what subject or biological process:

Subject / Process	Count
Mitosis	8
Meiosis	5
Cell Growth	3
Cell Processes	3
Cell (General)	3
Embryo Development (representing all kingdoms of living things)	3
Growth	2
Fertilization	2
Movement	2
Protist	2
Botany	2
Phagocytosis	2
Decay	1
Responses	1
Immune Reaction	1
Earthworm	1
Genetics	1
Marine Ecology	1
Comparative Processes	1

- Still images: Of what subject or biological process:

Subject / Process	Count
Different Organisms' Cells	8
Cells	4
Cell Organelles	4
Cell Division	2
Botany	2
Chromosomes	1
Single Cell Organisms	1
Organisms from all different kingdoms of living things	1
Protist	1
Microbes	1
Photosynthesis	1
Genetics	1
Leaf Stomata	1
Earthworm	1
Marine Ecology	1
Evolutionary Variation	1
Development (stages) of different organisms	1

- Demonstrations on the museum floor: Of what subject or biological process:

Subject / Process	Count
Interaction of organisms with environments	1
Cell growth	1
Zebrafish embryo	1

- Laboratory experiments and presentations using our microscope: Of what subject or biological process:

Subject / Process	Count
Development (embryo)	2
Dissection (worms, heart, kidneys, etc)	1
Fertilization	1
Cloning	1
Stimuli/Responses in Organisms	1
Bacteria grown in different conditions	1
Infectious Disease	1

- Other Comments:

time-lapse: Put Online

Megapixel images with a print resolution around 200 dpi or better and a size of ~4x4 or higher.

A chance to learn about this amazing technology!

CONCLUSIONS

Teachers were particularly interested in obtaining high-quality, time-lapse videos of dynamic biological processes (especially mitosis) for their classrooms. Currently, nearly half of the teachers interviewed found it hard to find any good quality material. Teachers were less interested in using the Imaging Station equipment for laboratory experiments or presentations set up by staff.

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APPENDIX A: Survey**Teacher Questionnaire****Imaging Station**

Please answer the following questions to help us determine what the Imaging Station can do to support your teaching.

Time Lapse Video

1. Have you used time-lapse video in your teaching for biology (e.g., to show cellular events, development, other microscopic processes)? YES NO

If YES

- a. What has been successful?
- b. What difficulties have you had in using time-lapse in your teaching?

If NO

Why have you not used time-lapse video?

2. What types of time-lapse video would you like to use, if any, in your teaching for biology? For example, are there certain biological processes or subject matter you would like video of?
3. How much content information would you like to accompany the video we provide?
4. Do you currently have access to time-lapse video for biology? YES NO

If YES

- a. Where do you get your time-lapse video from? (e.g., web, library collections)
- b. How did you find this resource?

Still Images

5. What types of images would you like to use that you cannot get currently? For example, are there certain cellular processes or subject you would like images for?

6. How much content information would you like to accompany the images we provide? Please describe

Floor Experiences with the Microscope

7. How can we improve the stand-alone (non-facilitated) microscope exhibit, which you saw, for your students when you visit the Exploratorium during a field trip? For example, are there additional supports that you would like to see at the exhibit.

8. How can we improve or augment the demonstrations we currently have on the floor for your students on a field trip? For example, are there certain subject areas (e.g., genetics, development) that you would like to see explored in a floor demonstration?

In General

9. What are the two most important resources we can provide you from the Imaging Station.
 - a. Time-lapse video.
Of what subject or biological process:

 - b. Still images
Of what subject or biological process:

 - c. Demonstrations on the museum floor

Of what subject or biological process:

- d. Laboratory experiments and presentations using our microscope

Of what subject or biological process:

- e. Other _____

Please describe:

If you have any other comments or suggestions for how the Imaging Station can be used as a teaching resource, please send email to c[REDACTED]@exploratorium.edu.

Thank you.