New Directions in Broader Impacts—Communicating Scientific Research through Science Cartoons (Sci-Toons)

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Abstract

The Science Cartoons (Sci-Toons) initiative, an informal science education program in Brown University's Science Center, was developed to engage students of diverse backgrounds through the creation of science animations. About 8-10 students and faculty are involved with the initiative per semester. Sci-Toon projects combine art, animation, high-quality multimedia and storytelling and represent a new approach for communicating scientific research and concepts to diverse audiences, through the creation of teams comprised of STEM majors, non-STEM majors, and individuals with expertise in animation. Team members are provided with technical training in both animation, story-telling, and science and produce science animations (cartoons) that engage diverse audiences. Their products can be viewed at (http://www.youtube.com/user/SciToons).

Motivating Key Questions

- ❑How do we get *diverse audiences* excited about science?
- ❑How do we get *Non-STEM majors* interested in STEM?
- ❑Do narratives encourage students to develop *greater understanding and appreciation* of science?
- ❑How do we engage *STEM majors* in science communication?
- ❑What is the current and future *role of visual media*, including animated narratives as tools for broader impacts in formal and informal science education settings?

An example of Conventional Broader Impacts

Fig. 1: Glacier dynamics hands-on activity

Modeling of Natural Occurrences —*Glacier dynamics activity*[1]

- ❑To determine which conditions (slope, "ice" temperature and basal conditions) affect the glacier speed the most
- ❑Students demonstrated strong interest in geo-sciences after participating in glacier dynamics activities

Can Sci-Toons serve as tools for Broader Impacts engagement?

- ❑A 'good' story, which is a key element of Sci-Toons, appeals to a broad audience and is key to successful communication
- ❑ Technology, another key element of Sci-Toons, is central to the daily life of a broad and diverse group of Americans

Sci-Toons Initiative

Fig. 2 Characteristic of Team composition for Sci-Toon projects

Approaches:

- ❑Expert and novice interactions
- ❑ Storytelling development
- ❑Combine art, animation, high-quality multimedia and storytelling to engage a broader audience in science

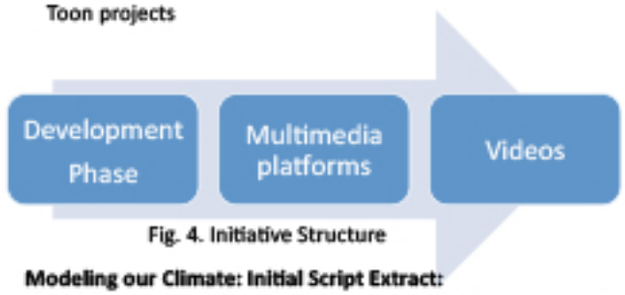

Fig. 4. Initiative Structure

Modeling our Climate: Initial Script Extract:

When we need to scientifically study a thing that is too vast or too complex in reality, we choose to recreate it in a simpler manner, or make a version of the real thing that is easier to study or analyze. This copy that is built for our purposes of understanding the original is what we call a model. By definition, a model is not correct, that is, it does not function as well as the thing it is a model of. But it works a lot like the thing it is supposed to be like -- to a reasonable degree of accuracy with accountable error margins.

Sci-Toons Team inputs →

Modeling our Climate: Final Script Extract:

When we need to study something in science that is too large or complex to easily work with, we'll often make a model of it in order to recreate it in a simpler way. You might not realize it, but we actually use models all the time in our everyday lives.

Team input was responsible for simplifying and clarifying an explanation of model originally drafted by a STEM expert.

What is story?

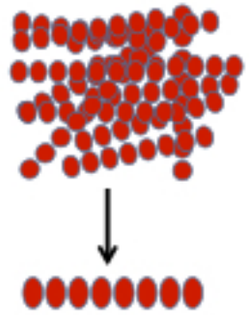

Fig. 3. Schematic for sequence of events

- ❑Narrative is a sequence of (complex) events that involves content (concepts), characters and conflicts.
- ❑From the complex story, *key elements are extracted and used to construct a sequence of meaning events.*
- ❑Three elements of storytelling (Livo & Reitz 1986[2]): the *story*, *the narrative* – telling the events, *the narrating* – the way the story is told

The 3S:

- ❑Scripts
- ❑ Storyboard
- ❑Sci-Toons

Example of Sci-Toons

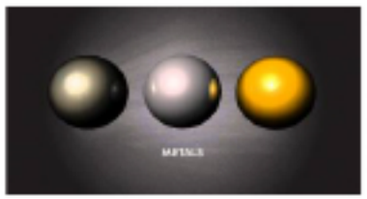

Fig. 5 Conductive Polymers

Downloaded by people in 68 Countries.
Top 5 viewing countries are:

- ❑United States
- ❑India
- ❑United Kingdom
- ❑South Korea
- ❑Poland

Fig . 6 Modeling our Climate

Downloaded by people in 27Countries.
Top 5 viewing countries are:

- ❑United States
- ❑India
- ❑Australia
- ❑United Kingdom
- ❑Switzerland

Conclusions

- ❑Novice and experts are involved in the development of Sci-Toons
- ❑Scientific research is communicated to broad and large audiences
- ❑The creators and viewers of Sci-Toons benefit from the process and product
- ❑Students from diverse academic backgrounds are engaged in STEM literacy
- ❑Sci-Toons are developed for a wide spectrum of audiences
- ❑Sci-Toons are distributed broadly via social media platforms

[1]Adetunji, O. O, J-C. M. Ba, W. Ghebreab, J.F. Joseph, L.P. Mayer and R. Levine, "*Geosciences Awareness Program: A Program for Broadening Participation of Students in Geosciences,*" Journal of Geoscience Education 60, 234-240 (2012).
[2]Livo, N.J and S.A Reitz (1986) *Storytelling: process and practice*. Littleton, CO; Colorado Libraries Unlimited, Inc.

For more information about Sci-Toons, contact
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