

Georgia Southern University

Digital Commons@Georgia Southern

Interdisciplinary STEM Teaching & Learning
Conference (2012-2019)

Mar 7th, 11:30 AM - 11:50 AM

The Power of Animations in STEM Courses

Adrian Heinz

Georgia Gwinnett College, aheinz@ggc.edu

Xin Xu

Georgia Gwinnett College

Follow this and additional works at: <https://digitalcommons.georgiasouthern.edu/stem>



Part of the [Curriculum and Instruction Commons](#), [Educational Methods Commons](#), [Instructional Media Design Commons](#), and the [Science and Mathematics Education Commons](#)

Recommended Citation

Heinz, Adrian and Xu, Xin, "The Power of Animations in STEM Courses" (2014). *Interdisciplinary STEM Teaching & Learning Conference (2012-2019)*. 72.

<https://digitalcommons.georgiasouthern.edu/stem/2014/2014/72>

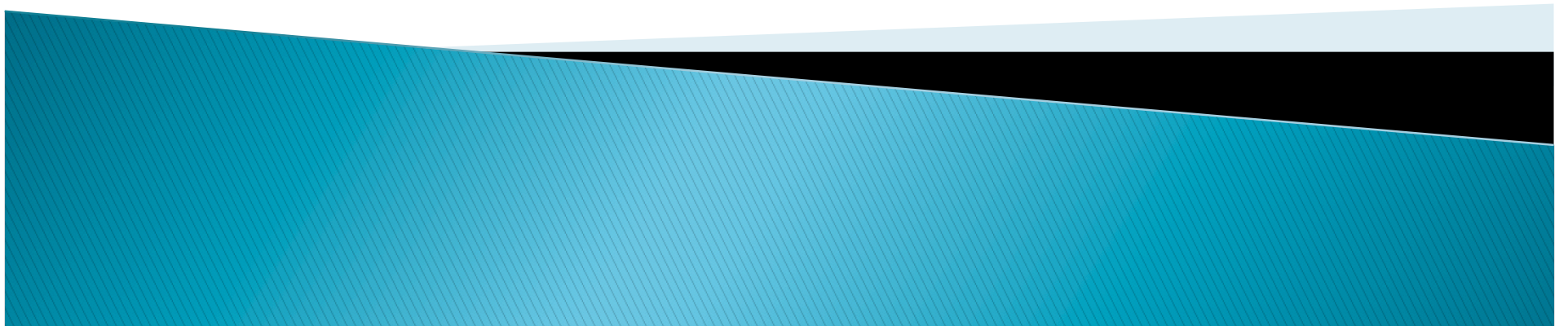
This event is brought to you for free and open access by the Conferences & Events at Digital Commons@Georgia Southern. It has been accepted for inclusion in Interdisciplinary STEM Teaching & Learning Conference (2012-2019) by an authorized administrator of Digital Commons@Georgia Southern. For more information, please contact digitalcommons@georgiasouthern.edu.



Enriching STEM Education with Web Animations

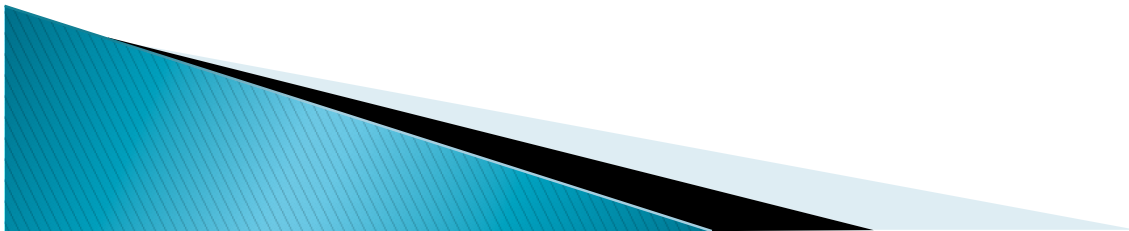
Dr. Adrian Heinz (PI), Dr. Xin Xu (Co-Pi)

Students: Michael Watkins, Nisha Mudbhary



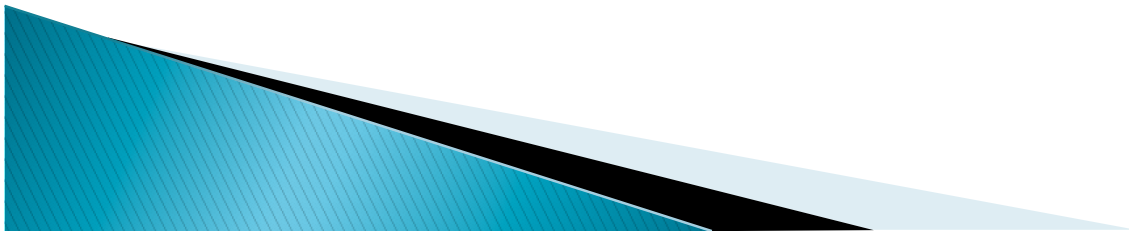
Outline

- ▶ Introduction. Purpose
- ▶ Project goals
- ▶ The Animation development cycle
- ▶ Demo of animations
- ▶ Data collection and analysis
- ▶ Discussion: Challenges and future work



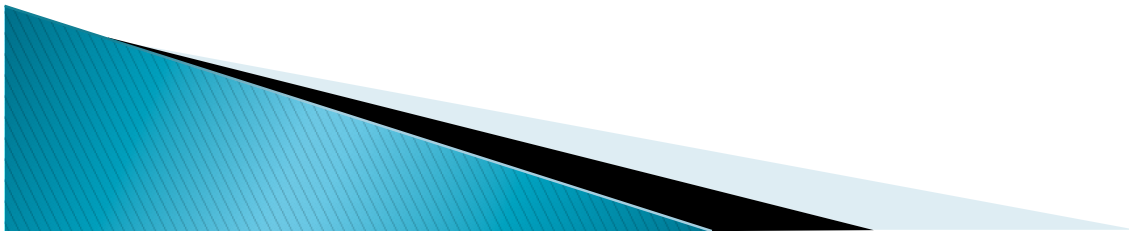
Introduction

- ▶ Why this project?
 - Lack of STEM professionals.
 - Students should be encouraged to pursue STEM disciplines.
 - STEM students do not receive enough research exposure.
 - STEM students do not experience interdisciplinary collaboration.



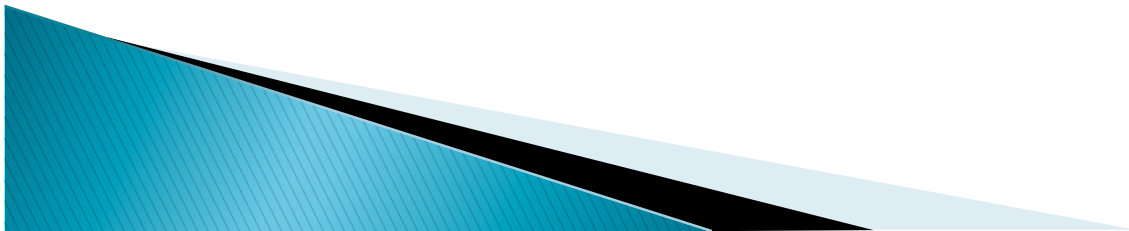
Project Goals

- ▶ IT students will
 - Become more engaged in STEM courses.
 - Gain experience in a real-life development project.
 - Acquire technical expertise by learning to use new applications.
 - Collaborate with professionals in other STEM areas.
 - Be exposed to interdisciplinary research.



The Development Cycle

- ▶ STEM faculty members as “Clients”
- ▶ IT students as developers.
 - Meet with client to gather requirements.
 - Develop a prototype.
 - Gather preliminary feedback.
 - Further modification.
- ▶ Weekly meetings with STEC4500/STEC2500 faculty to report progress and discuss challenges.



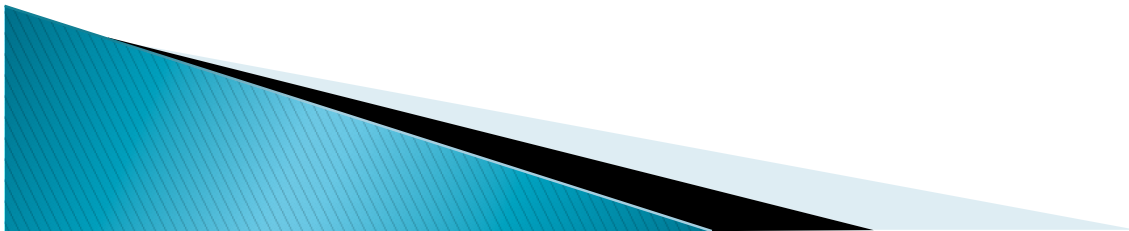
Work Summary

- ▶ Ongoing project since 2011
- ▶ Completed over 30 animations in STEM areas
 - Biology
 - Chemistry
 - Math
 - Exercise Science
 - IT
- ▶ Presented animations at conferences in Orlando (FL), Ponte Vedra (FL), and San Antonio (TX)
- ▶ Journal Submission. In preparation
- ▶ Website: <http://stemanim.ggc.edu/>



Current Work

- ▶ Fall 2013
 - 3 Senior students
 - 4 Animations
 - 3 Biology
 - 1 IT
- ▶ Spring 2014
 - 4 Students. Freshman, sophomore and seniors.
 - Goal: 4 animations



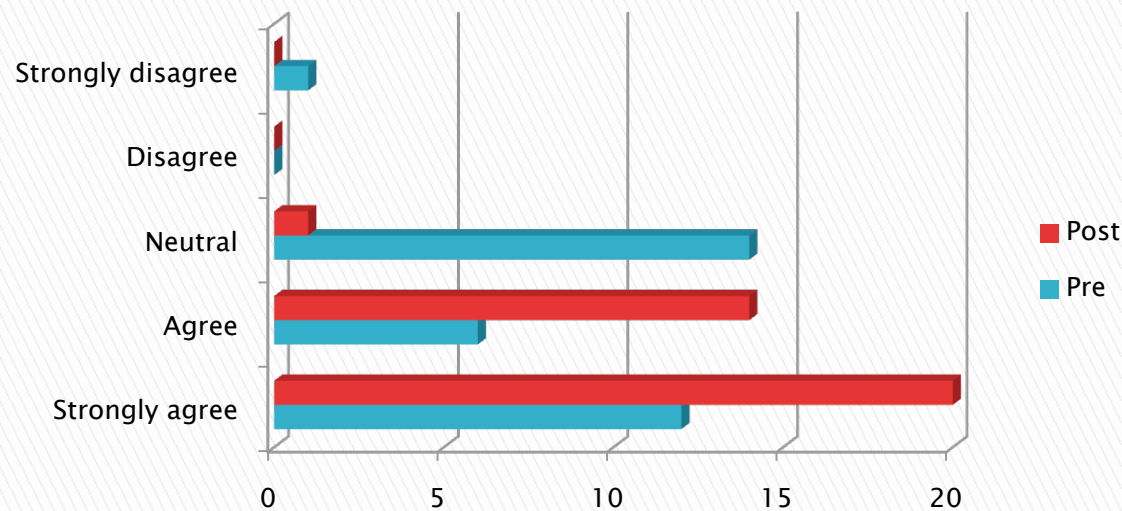
Data Collection and Analysis: Algebra Functions

Pre Survey: Having an animation would be helpful in learning transformations of functions

- ▶ Strongly agree: 12
- ▶ Agree: 6
- ▶ Neutral: 14
- ▶ Disagree: 0
- ▶ Strong disagree: 1

Post Survey: Having an animation was helpful in learning transformation of functions.

- ▶ Strongly agree: 20
- ▶ Agree: 14
- ▶ Neutral: 1
- ▶ Disagree: 0
- ▶ Strong disagree: 0



Student Feedback

- ▶ Great way to see what's going on
- ▶ It really helps by giving the students an actual visual of what we are learning
- ▶ It helps visualize the graphics
- ▶ The computer animation helped me learn
- ▶ I think it is more effective than a teacher attempting to draw it out
- ▶ I'm a visual learner and I found the animations to be extremely helpful



Content related questions

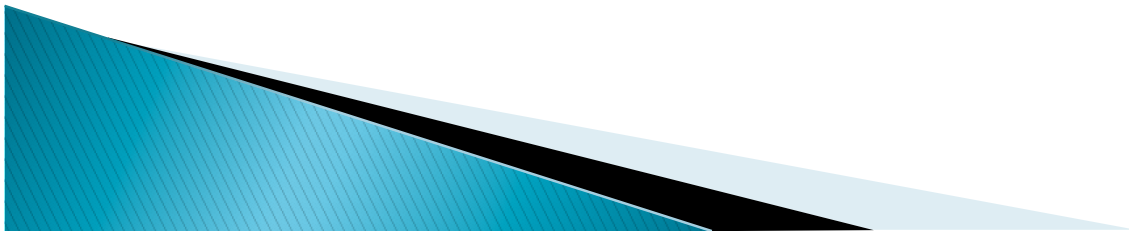
Sample size 30

Questions	Pre Number of students answered correctly	Post Number of students answered correctly
1	14	26
2	8	12
3	20	16
4	12	26

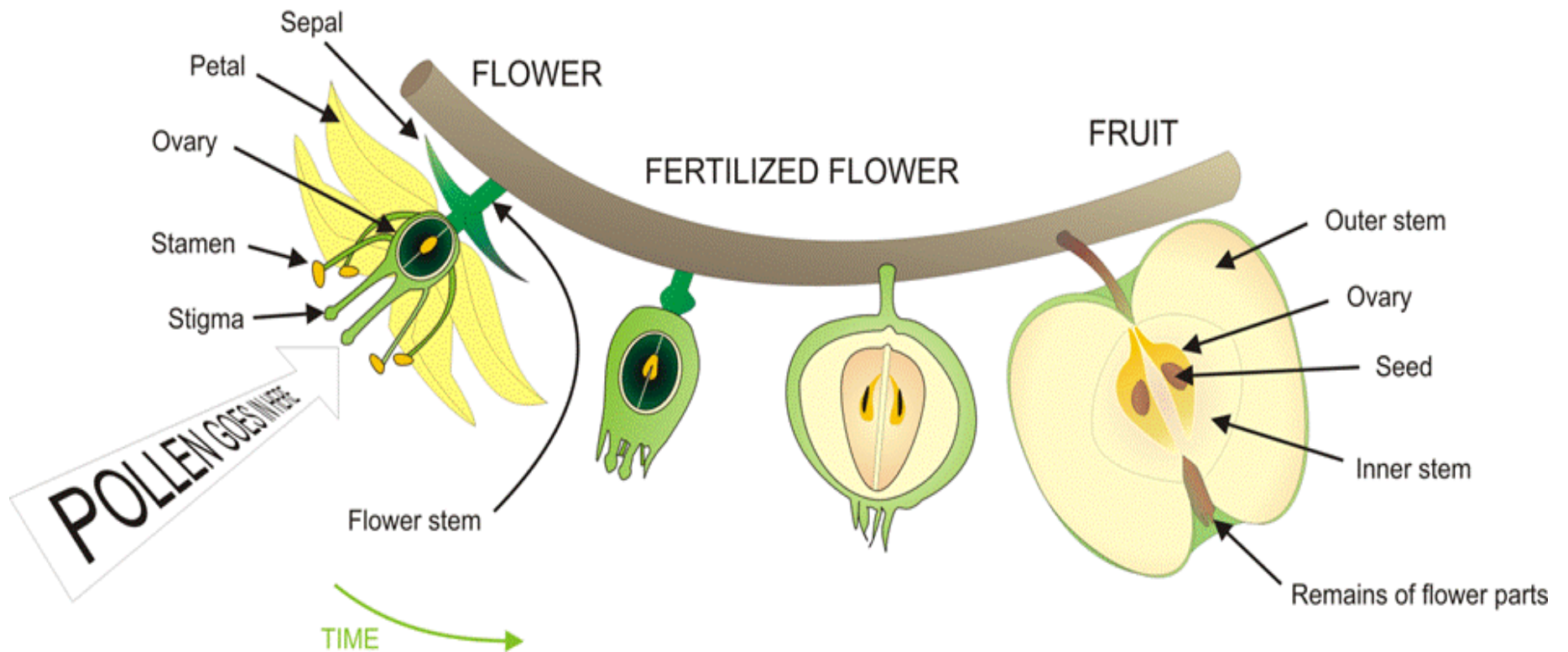


Animations

- ▶ Demos.
 - Michael Watkins
 - Nisha Mudbhary



FRUIT AND SEED DEVELOPMENT



Angiosperm

Flower Anatomy

Press Play
to Cont.



During the Cretaceous period dinosaurs fed, fought, and loved in a luscious coniferous forest. Plants did not have any flowers or fruit and, so, were dependent upon wind and water to carry their pollen the next plant. The inefficient process requires millions of pollen grains in the hope that a few will reach their destination.

200 million years ago, flowers evolved to trick or pay animals (pollinators) to carry their pollen from one individual to another.

Since then the Angiosperms or flowering plants have become the dominate form of plant life with over 400,000 species. We rely on them for oxygen, food, clothing, and shelter.

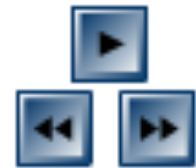
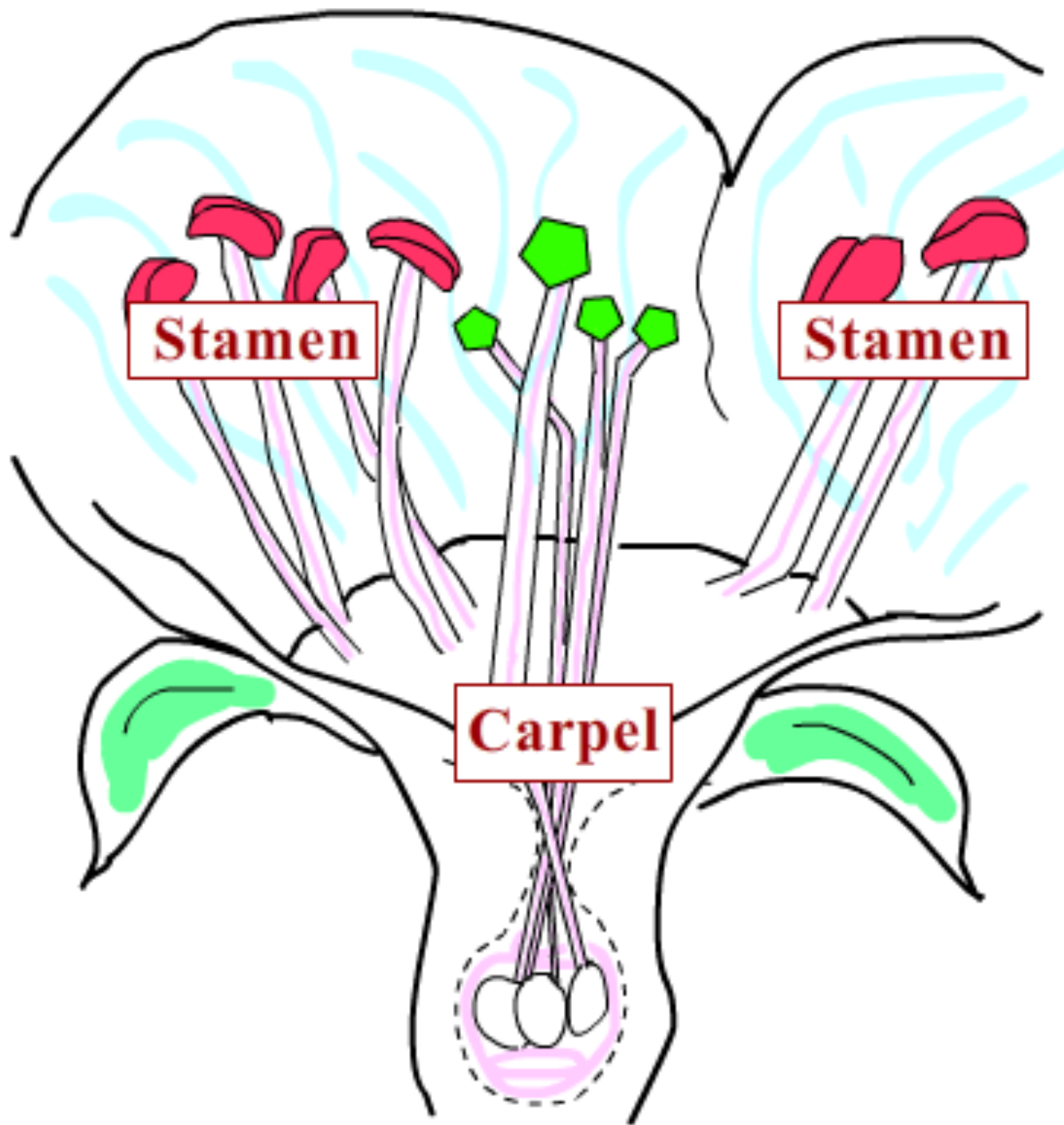
Anatomy

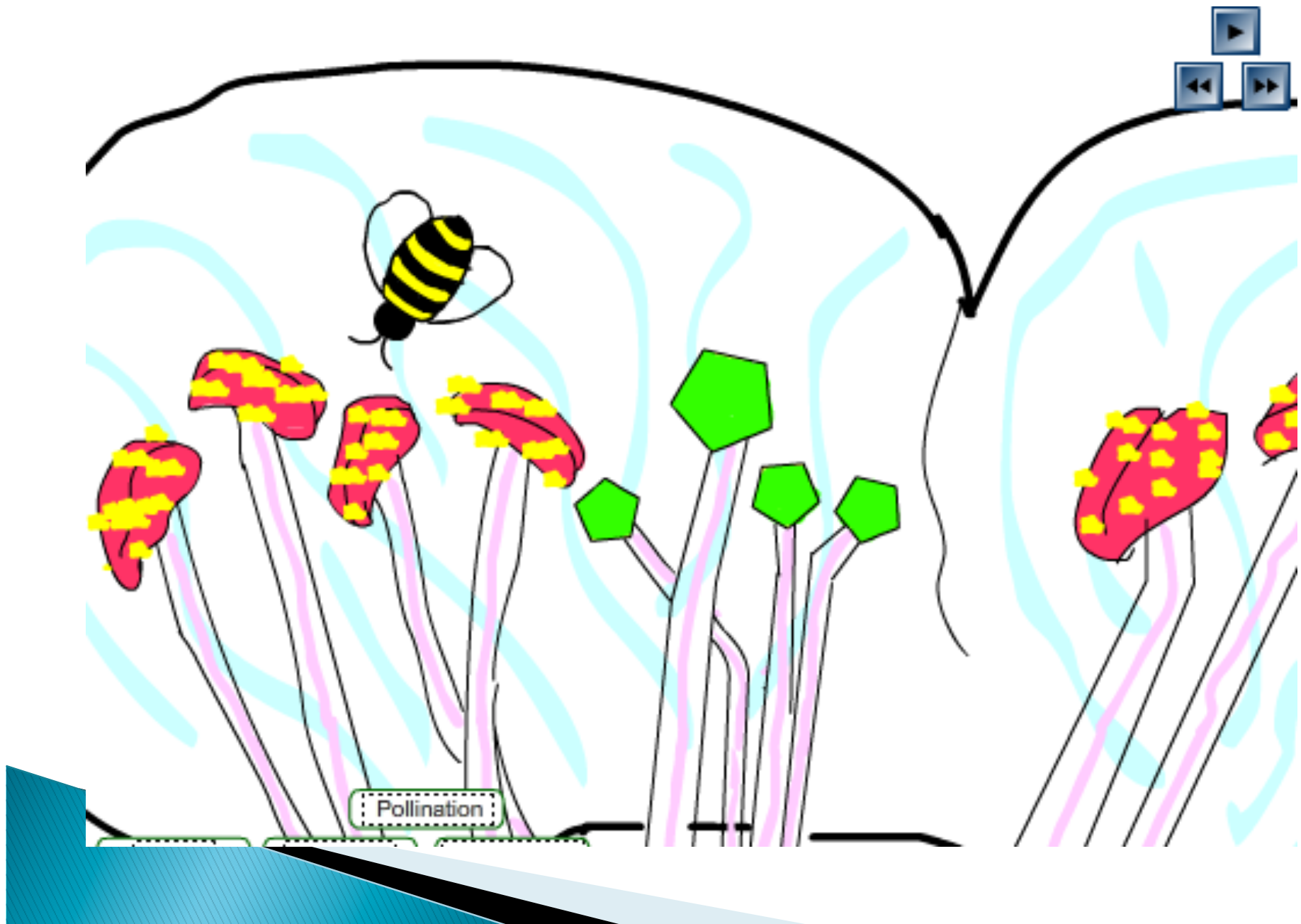
Main

Pollination

Development

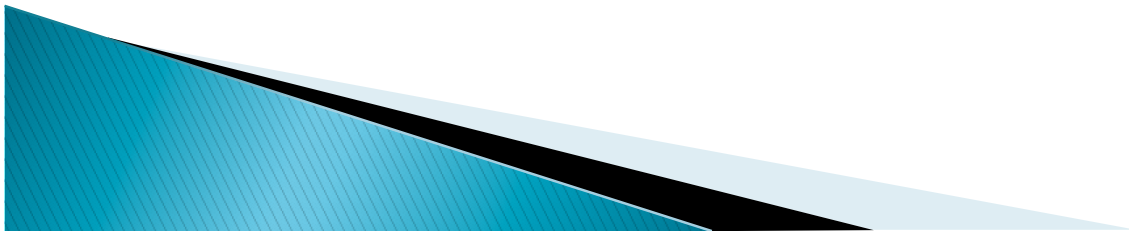
Plant





Presentations / Publications

- ▶ Heinz A., Xu Xin. *Interactive and Cooperative Learning on the Web*. 24th International Conference on College Teaching and Learning. Ponte Vendra Beach, FL. April 2013.
- ▶ Xu X., Heinz A., D'Costa A. *Engaging Biology and IT Students by Creating Cell-Biology Web Animations*. Georgia Scholarship of STEM Teaching and Learning Conference. Georgia Southern University. Statesboro, GA. March, 2013.
- ▶ Xu X., Heinz A. *Web-Based Animation in Education*. Conference of the International Society for Exploring Teaching and Learning. San Antonio, TX. October 2012.
- ▶ Heinz A., Xu X. *Using Web-Based Animation in STEM Education*. 10th International Conference on Education and Information Systems, Technologies and Applications (EISTA 2012). Orlando, FL. July, 2012.



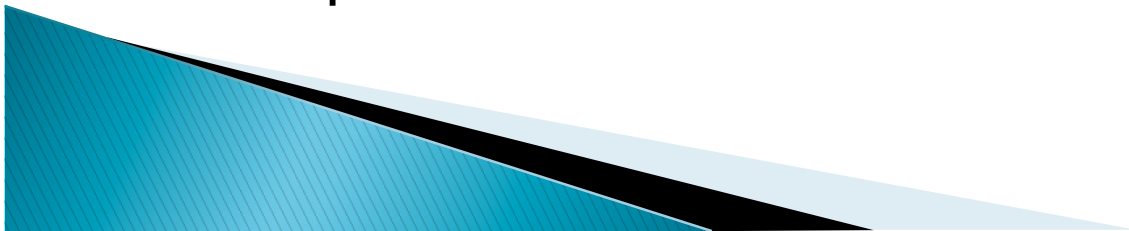
Discussion

▶ Challenges

- Recruiting student developers!!!

▶ Future work

- Continue the development of web animations
- Further Collaborate with faculties from other discipline
 - To help recruiting students
 - Develop a set of animations for a certain course
- Additional data collection & analysis to discover the impact of the web animations on student learning



Questions?

Thank you!

