Online Teaching Conference

Presented by: California Community Colleges | TechConnect

Empowering Special Need Students - Accessible On-line Biology Laboratory Experiences

Dr. Roy Mason

Ms. Tessa Turner

Mt. San Jacinto College

How do we actively engage ALL learners, including those with special needs, in successfully completing District Learning Objectives (DLOs) and Course Learning Objectives (CLOs) in a fully-on-line learning non-majors Biology Environment?

Empowering Special Need Students - Accessible On-line Biology Laboratory Experiences

MSJC Large Service Area (approximately 2500 square mile)
Situated at the base of two mountain ranges 60 mile east of LA.

Mt. San Gorgonio 11,500'

Mt. San Jacinto 10,800'

MSJC Transition to a Suburban Community College Western Riverside County

Established 1963

Rural Communities

Mostly Agricultural

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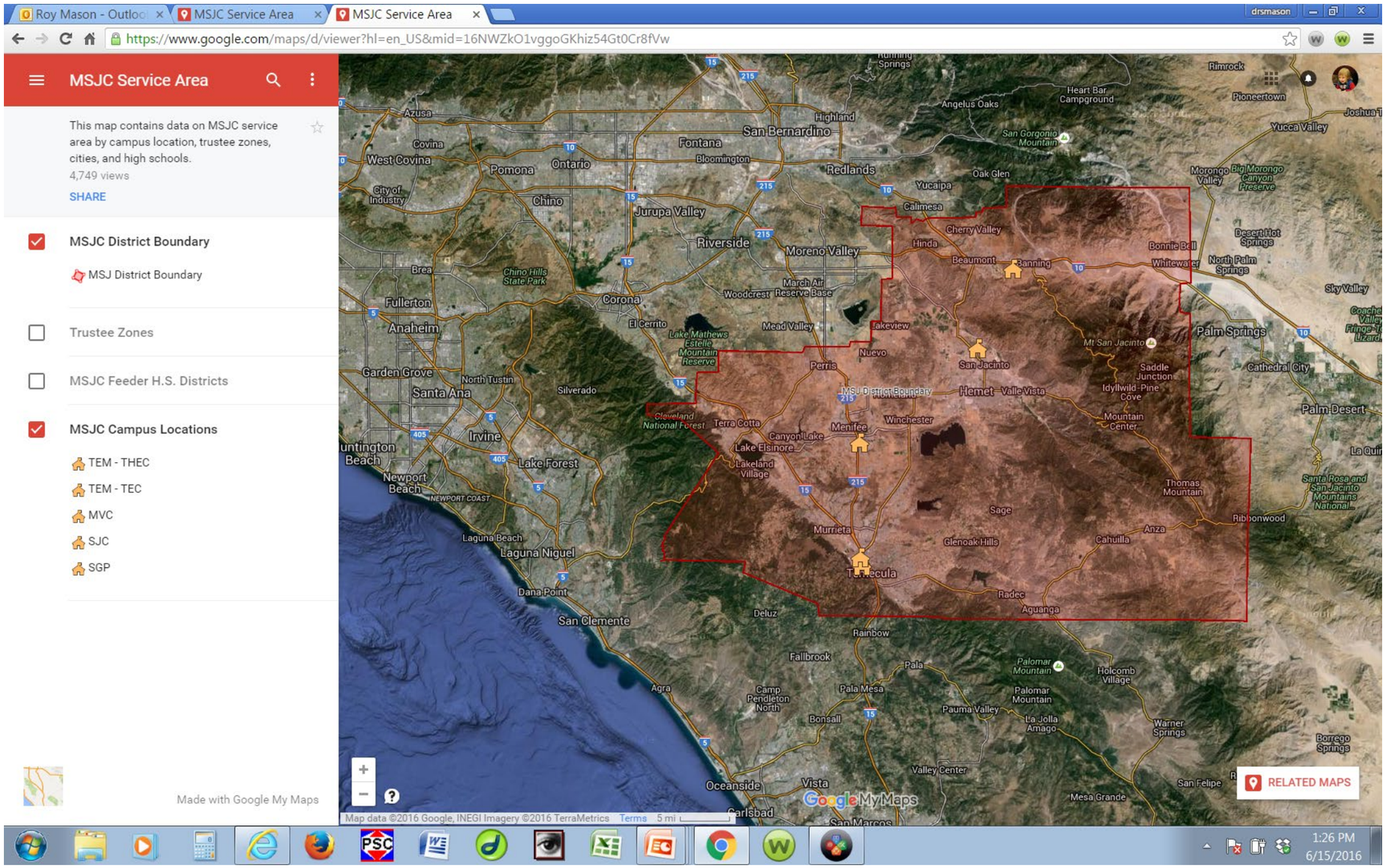
MSJC Significant Growth over last in last 20 years.



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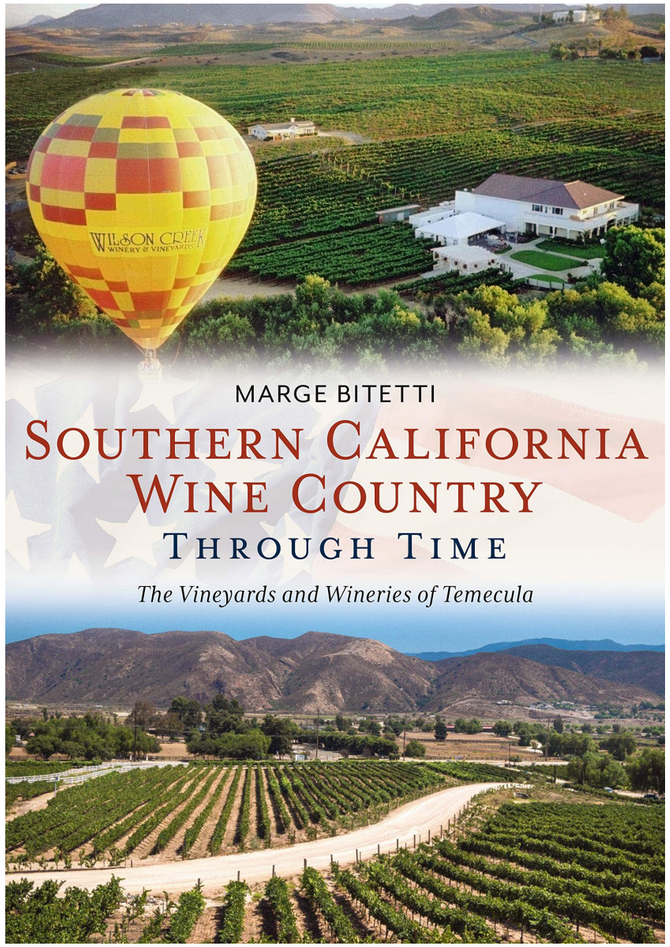
College Service Area has Grown –
Temecula, Murrieta, Menifee, Lake Elsinore, Perris, Beaumont, I 10 Corridor

Enrollment Sky-Rocketed

15,000 FTES -20,000 head count

Menifee Valley Campus Arts Building



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MSJC Last 20 Years - Bedroom Commuter Communities for San Diego and Los Angeles Counties

2 Major Campuses
San Jacinto
Menifee Valley

Education Centers
Temecula
Banning

Menifee Valley Campus Technology Building

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More than 18 years ago, MSJC wanted to develop a fully online AS degree. How do we meet the science laboratory courses degree requirement*?

Issues:

- **Faculty Attitudes**
- **Course Rigor**

*(4 Semester Unit Science with labs required For transfer to State Universities)

Menifee Valley Campus Nursing and Science Buildings

Science Faculty Attitude

"Over our dead bodies!"

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Course Rigor - Can student learning outcomes be achieved?

Is the on-line laboratory experience on par with the on-campus experience?

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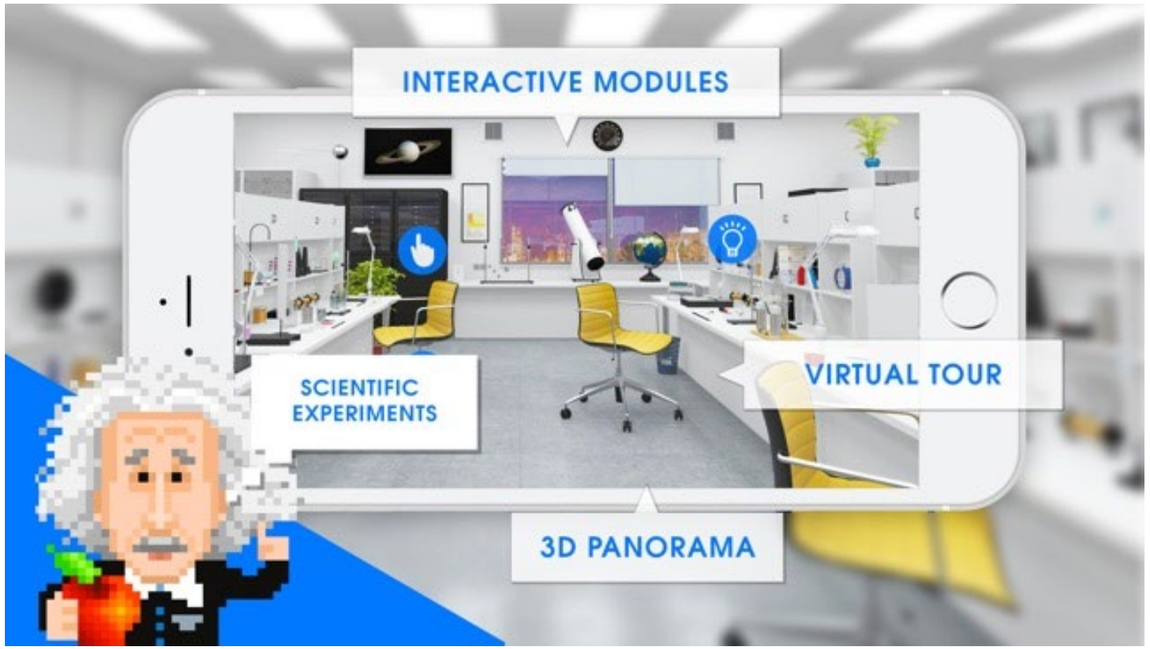


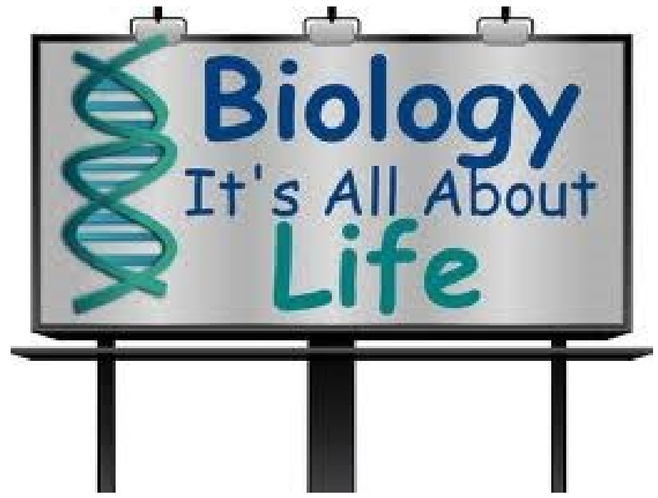
Curriculum Committee: Pilot a Course for Non-Major Introduction to Biology

First section of *Biology 115* offered fully online in 2004

Within a year, the number of course sections increased to meet demand.

Tremendous student response.

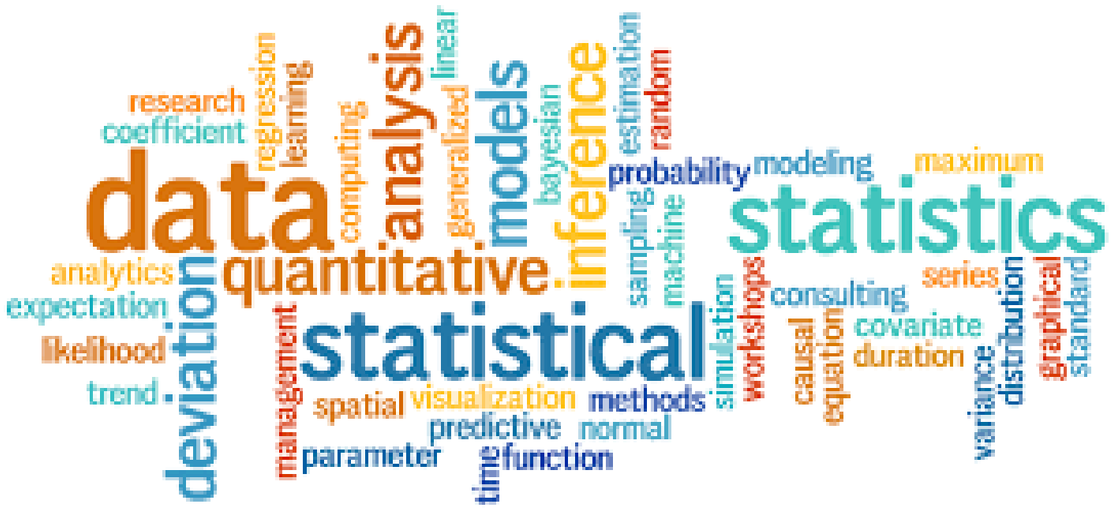
Student performance information gathered.



Research Concern

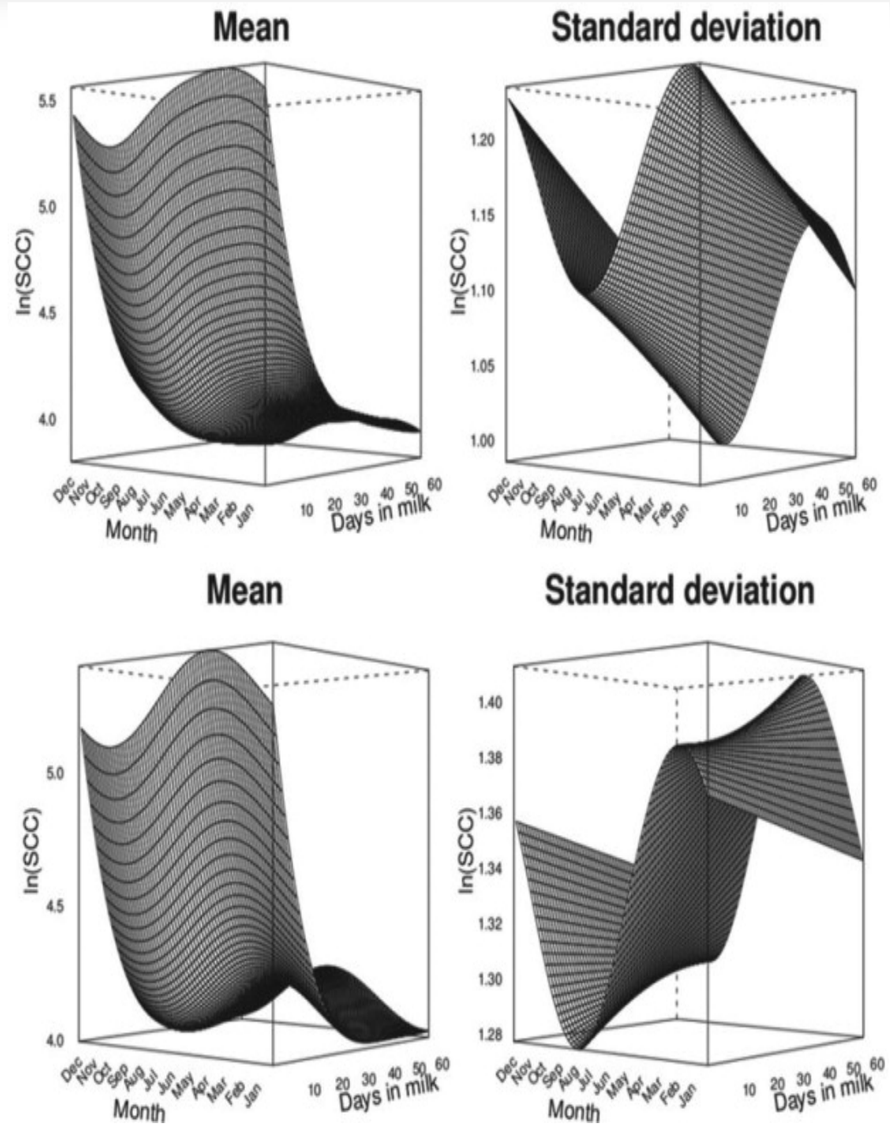
Some MSJC faculty and other higher education decision makers still questioning the equivalency of on-line courses to on-campus courses for degree completion and transferability.

Show me the data!



Research Hypothesis

On-line course delivery is equivalent to on-campus course delivery in determining a student's level of attainment of student learning outcomes in a non-majors introductory biology course.



Biology 115 Course Student Learning Outcomes – Lecture

1. Analyze and solve problems using the methods of scientific inquiry, observation and measurement.
2. Integrate the basic principles of chemistry to construct an understanding of biology at the cellular, organismal, and ecosystem levels.
3. Learn the language of biology and correctly use terms in written and oral communication.
4. Know what defines life and be able to discuss biological organization extending from molecules to ecosystems.
5. Construct and illustrate the similarities and differences of prokaryotic and eukaryotic cells with regard to structure and function, illustrate traffic across membranes, and inspect the acquisition and use of energy in metabolic processes.
6. Evaluate and illustrate mitosis, meiosis, and the flow of information from genes to protein.

Biology 115 Course Student Learning Outcomes – Lecture

7. Characterize Mendelian principles of inheritance, and evaluate and appraise the significance of DNA technology.
8. Formulate hypotheses of how structure correlates with function at all levels of hierarchical organization.
9. Evaluate and draw conclusions about the interactions between organisms and the interactions organisms have with their environment and analyze the various mechanisms by which organisms maintain homeostasis.
10. Characterize and authenticate the unity and diversity of all organisms within the Kingdoms and Domains of classification.
11. Demonstrate the mechanisms of evolution, and analyze the evidence in support of evolutionary theory.
12. Relate the interdependent nature of science to technology, and evaluate the role of society in shaping the application of scientific knowledge.

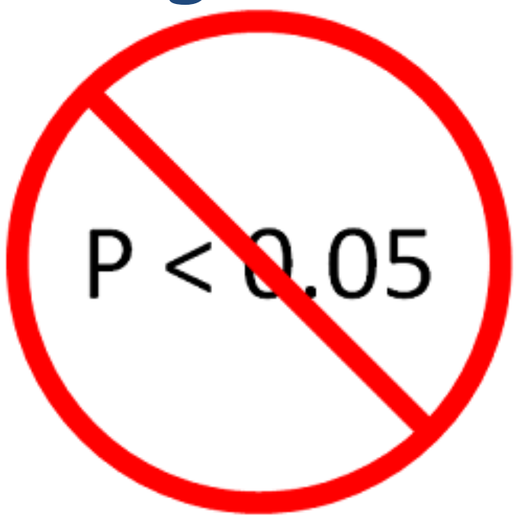
Biology 115 Course Student Learning Outcomes – Laboratory

1. Engage in the collection of data using various measures, apply scientific methods to investigate biological principles, observe phenomena, test hypotheses, solve problems, and report in scientific format.
2. Using the periodic table, construct diagrams of atoms, molecules, and illustrate the bonding capacities, and design models of macromolecules.
3. Demonstrate proficient understanding of the principles of microscopy in the study of cells and microorganisms.
4. Illustrate and distinguish the differences between the cell types of prokaryotes and eukaryotes, compare and contrast their structures, and critique methods to differentiate organelles.
5. Evaluate the process of osmosis occurring across a semi-permeable membrane, and deduce direction of net water movement under isotonic, hypertonic, and hypotonic conditions.
6. Evaluate and illustrate the phases of mitosis and meiosis through direct observation of mitotically dividing onion root tip cells and other prepared slides.

Biology 115 Course Student Learning Outcomes – Laboratory

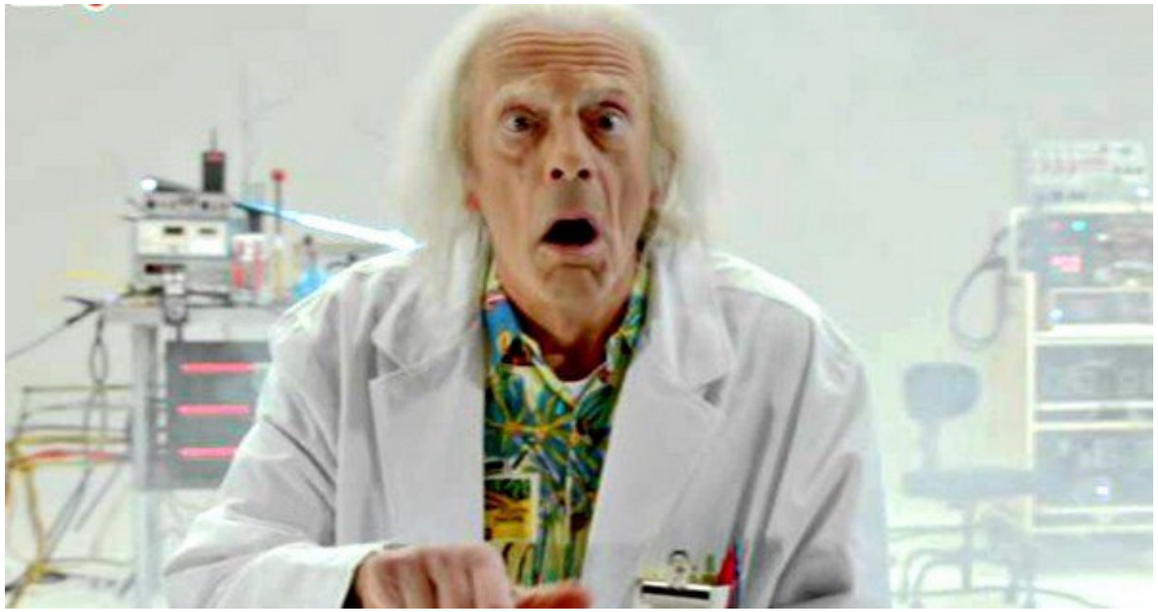
7. Characterize the complexity of DNA by creating a model, extracting DNA from cells, and/or witnessing DNA technology and its applications.
8. Analyze natural selection including differential survival, reproduction.
9. Identify and critique representative organisms of the five kingdoms: major phyla of Kingdoms Animalia and Protista, classes of vertebrate animals, major divisions of Kingdoms Plantae and Fungi, and bacterial and fungal microorganisms.
10. Locate, describe and identify external anatomical structures and internal organs in a frog and compare their presence and function to that of human anatomy.
11. Identify, contrast and evaluate the chemical processes of photosynthesis and cellular respiration.
12. Evaluate the importance of organic molecules to living systems and their importance to human nutrition.
13. Use the laws of probability and a Punnet square to solve inheritance problems.

A majority of the data analyzed by this research indicate no statistically significant differences in completing student learning outcomes in on-line and on-campus courses in non-majors biology offered by the Menifee Valley Campus, Mt. San Jacinto College.



New Question: Is Our On-line Course Accessible?

Are Our On-line Classes as Accessible as Our On-campus Classes?



Especially the Laboratories?

New Question: Is Our On-line Course Accessible?

DELTA Team

DELTA

Worked with Course Designers to evaluate "Accessibility" of All aspects of the course including the laboratories.

Faculty Attitude: Changes in Delivery

Original Format	New Format
Blackboard Course Delivery System	Canvas Course Delivery System
Combined with	Combined with
"Kitchen labs"	"eScience labs"

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Previous Laboratory Materials – Kit was designed by MSJC Instructors

Kitchen Labs

- Preserved Frog with dissection tray and dissection kit
- Owl Pellet
- Dialysis Paper
- pH Papers
- Graduated Cylinder
- Metric Ruler
- Thermometer
- Metric Ruler
- Thermometer
- Beaker

Home Grown Laboratory Manual

Faculty Attitude: Changes in Laboratory

2015 -2016 MVC Biology Department Faculty began process to evaluate laboratory portion of the on-line sections of Biology 115

Goal of Evaluation: Propose a set of "Accessible" laboratory materials to complement laboratory exercises.

Faculty Attitude: Changes in Laboratory

Fall 2015 - 2016 after reviewing numerous options Biology Department Faculty agreed to evaluate ***eScience laboratory*** materials for laboratory portion of the course

What Does an Accessible Course Look Like?

- Eight week classes (two start periods: first half semester, second half semester) - includes 4-6 sections offered each term with additional 4-6 in summer semester

- Traditional 17 week classes – 4 sections each term

- Lecture materials presented with PowerPoint, video, and instructor-developed materials, use *Canvas* delivery system

What Does an Accessible Course Look Like?

- Course outline includes: twelve examinations, eight group discussions, and four scientific article reading evaluations.

- Authentic Laboratory Experience: twenty (20) laboratory experiences, sixteen (16) require *eScience* laboratory kit, four (4) exercises which require no specific scientific supplies.

What Does an Accessible Course Look Like?

Wanted a **fully self-contained laboratory kit**. Previous lab kit required students to purchase additional materials locally.

Concerned with "copyright" infringements.

Must Meet **"Federal Accessibility Standards" ADA II.**

Wanted a resource that would be easy for all instructors including "adjunct faculty".

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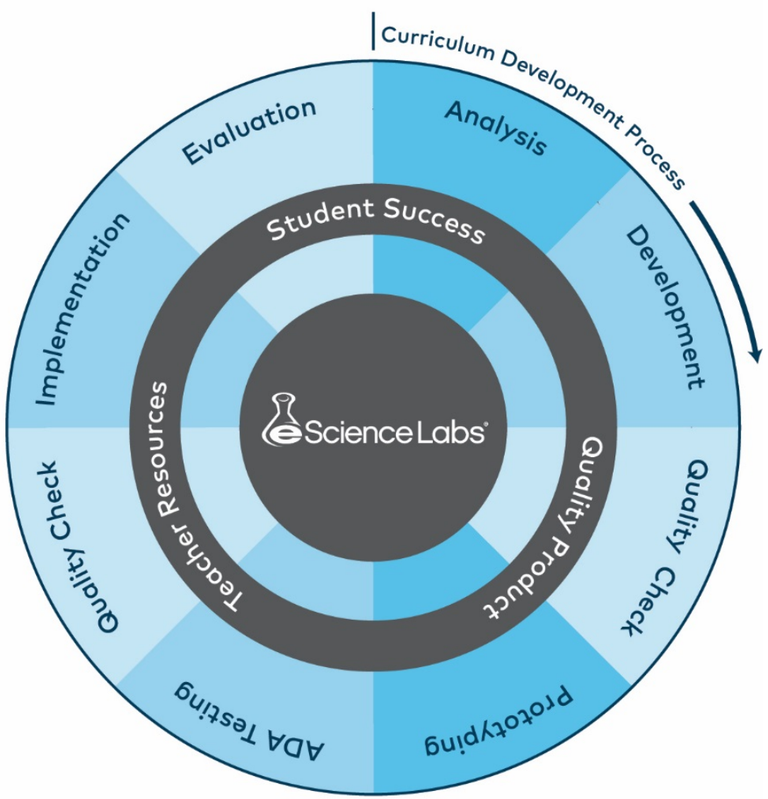
What Does an Accessible Course Look Like?



Authentic Experiential learning

- Hands-on experiments encourage student engagement

Priorities in lab design are student safety and engagement

Rigorous digital curriculum

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What Does Accessibility Look Like?

Students are provided a combination of hands-on science lab materials and supplies, virtual learning tools, and customized digital curriculum.

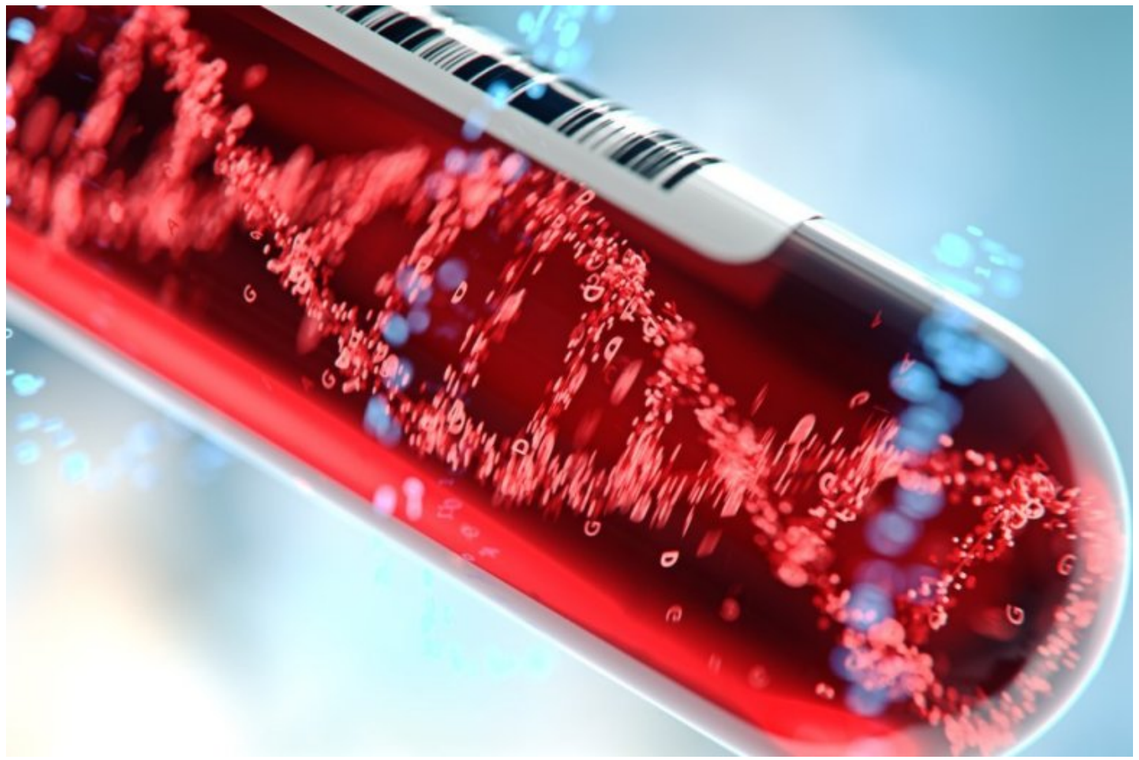
How Do We Make This Accessible?

What Does Accessibility Look Like?

Staff includes Instructional Aide content expert who works with our faculty to integrate the laboratory exercises into our curriculum.

Ms. Tessa Turner,
Instructional Aide
Department of Biology

DNA Extraction



What Does Accessibility Look Like?

SU 2020 BIOL-115
Topics in Biology -ONLINE-

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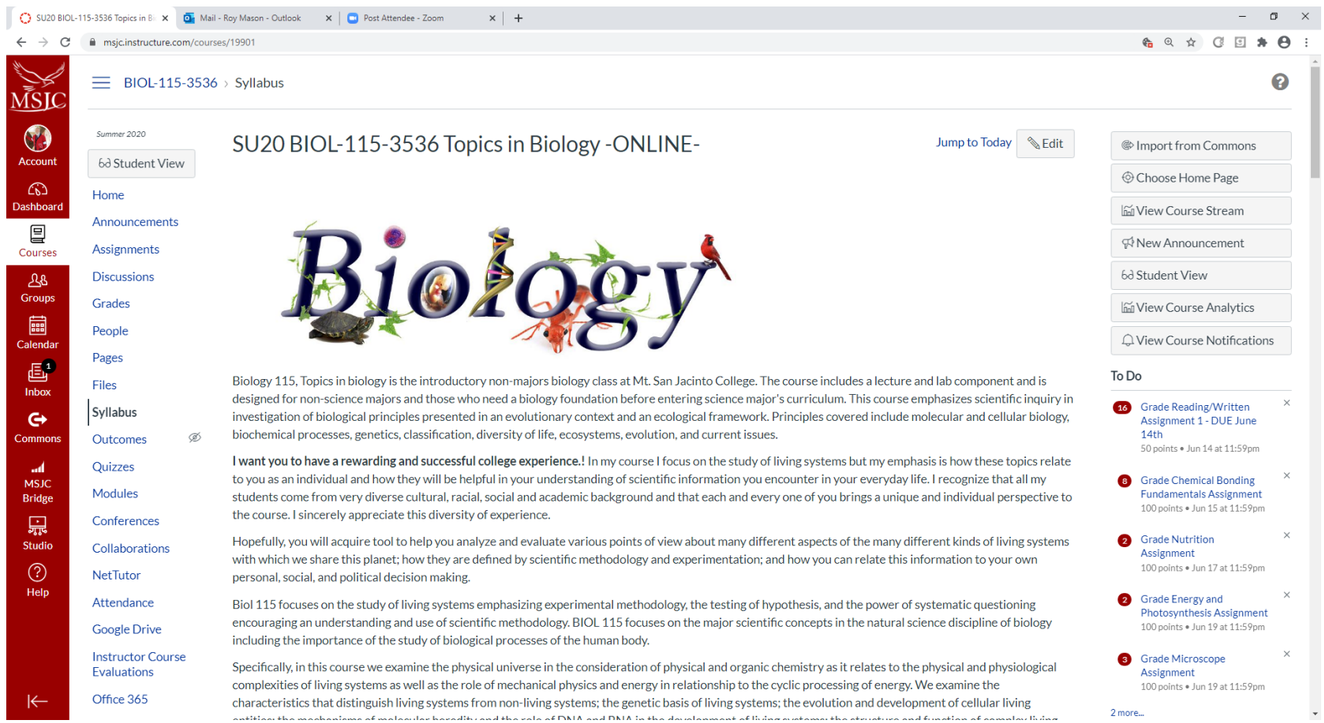
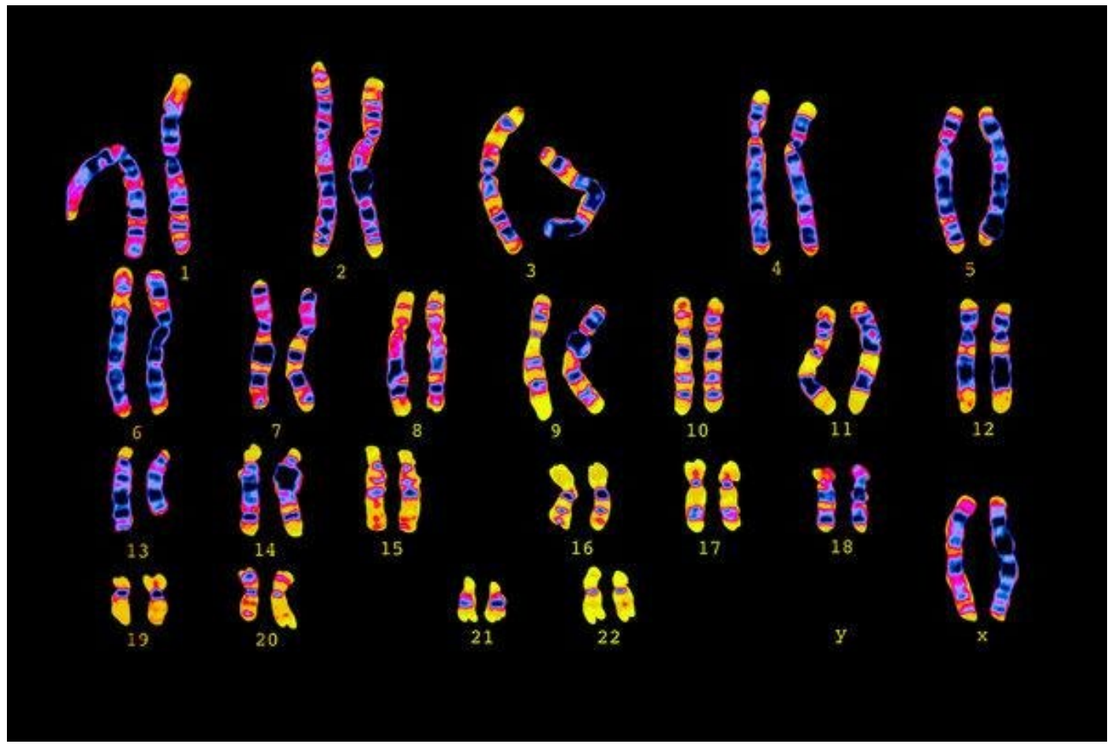
What Does Accessibility Look Like?

MSJC CANVAS:



So What Do You Think? On-line in Your Genes?

Questions and Comments



Contact Information

Thank you so much for your attendance.

Please feel free to contact either of us for any questions, concerns and/or a copy of this Power Point Presentation or additional information on our research project.

Dr. Roy Mason, rmason@msjc.edu

Ms. Tessa Turner, tturner@msjc.edu