Exploring the Impact of Michigan Learning Communities

Jennifer Maltby
Michigan Research Community
Michigan Learning Communities
Michigan Learning Communities

Common Mission:

- Support transition to college
- Retain underrepresented students

Program Components:

- Experiential Learning
- Academic Course(s)
- Academic Support
- Co-curricular Programming
Michigan Research Community

Undergraduate Research
Health Sciences Scholars Program

Pre-health observation and advising
Lloyd Hall Scholars Program

Writing and the Arts
Admissions

Process:
  o Students apply after matriculation
  o Essays/short answer questions

Criteria:
  o Fit for program
  o Quality of application
  o Most benefit
  o Cohort composition
Assessment Overview

Motivation

Pilot study
  o CRLT funding
  o Subset of MLCs
  o 2012

Full implementation
  o Six MLCs
  o 2013

Limitations
Assessment Design

Online survey
  - Administered: April 2012 & 2013
  - Incentive: $5 in Blue Bucks

Participants
  - Target Group: MLC students finishing first year
  - Control Group: First-year students living in residence

Combined with data from UM Data Warehouse
The Basics

2013 Participants

- HSSP: 117
- LHSP: 130
- Living Arts: 63
- MCSP: 109
- MRC: 101
- WISE RP: 99
- Control: 640
Entering the University: All Students

Incoming GPAs

<table>
<thead>
<tr>
<th>Year</th>
<th>MLC</th>
<th>CONTROL</th>
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<td>2013</td>
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N = 351 334

ACT Comp. Scores

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N = 282 496 517

SAT Scores

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<td>2013</td>
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N = 123 214 97 226
Entering the University: Underrepresented Minority Students

### Incoming GPAs

- **N=35**
- **N=38**

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### ACT Comp. Score

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### SAT Scores

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<tr>
<td>2013</td>
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Academic Performance Overview: All Students

Cumulative GPA

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Fall Academic Performance

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Winter Academic Performance

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<td>2013</td>
<td>3.34**</td>
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Academic Performance: Underrepresented Minority Students

Cumulative GPA

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<tbody>
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<td>N=40</td>
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<td>N=109</td>
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<td>N=71</td>
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Fall Academic Performance

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<td>N=109</td>
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<td>N=70</td>
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Winter Academic Performance

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<td>3.34**</td>
<td>2.81</td>
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<td>N=40</td>
<td>3.34**</td>
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<td>N=106</td>
<td>3.05</td>
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<tr>
<td>N=69</td>
<td>3.05</td>
<td>3.02</td>
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Learning Outcomes

1. Critical Thinking Skills
   Analyze and critically evaluate ideas

2. Intellectual Engagement
   Communicating with faculty
   Confidence in participating in academic discussions

3. Residential Environment Values & Supports
   Learning
Analyze and critically evaluate ideas

Control

MLC
Communicate with faculty

Control

MLC

Strongly Disagree Disagree Neutral Agree Strongly Agree
Confidence participating in academic discussions

Control

MLC

Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree
I talk about assignments & projects with people in my residence hall.
My residence hall makes it possible for me to succeed academically.
My residence hall supports my learning.
Next Steps

1. Continued survey revision
   - Depression Assessment
   - STEM and/or Pre-Med
   - Climate

2. Administer for 2014

3. Longitudinal assessment
Questions?
“What we do may not always be good for us*”
Analytics of Michigan Medical Students’ Histology Study Strategies and Learning Success

Michael Hortsch, Ph.D.
Departments of Cell and Developmental Biology and of Medical Education
University of Michigan Medical School

* University of Michigan first year medical student
Histology or Microanatomy (from the Greek ἵστος = tissue) is the study of the microscopic anatomy of cells and tissues.

It is taught at the beginning of most medical and dental curricula. The knowledge gained provides a cellular and ultrastructural “framework” for all of the other topics (anatomy, physiology, biochemistry, etc.).

Histology is also the basis for PATHOLOGY.
The Challenges of Learning Histology

It is a visual task.
Students are unfamiliar with cells and tissues at the microscopic scale and very few had previous experience.
Virtual Microscopy

At the University of Michigan histology is not taught using traditional microscopes, but from a course website with digitized microscopic images (like Google Earth).

That website and the Michigan virtual slide collection is accessible worldwide for free under a Creative Commons License.

Epithelial Tissue

Resources

- Choose:
  - Look A-Likes Sun-Kee Kim Cells and Tissues
  - Drawings Kent Christianan Epithelia
  - Second Look Michael Horten Epithelia
  - Lecture Handout John Ales Epithelia
  - Lab Introduction UM Epithelia

OBJECTIVES:

1. Be able to classify epithelial tissues.
2. Know the structure and function of junctions.
3. Know the structure of apical specializations and their functions.
4. Be able to correlate different types of epithelia to their functions.

In epithelia, cells are organized in sheets, either simple (one thick simple epithelium) or made up of multiple layers, and these cells are specialized for absorption, secretion, excretion, etc.
Learning as a Process

Learning the facts and terminology

Understanding learning objectives

Acquiring analytical and recognition skills

Applying analytical and recognition skills

Linking structures to functions

Self-evaluation of knowledge and skills

Proficiency
Different Flavors of Instruction & Learning Resources

Classical learning tools
- Textbook
- Electron micrograph posters
- Dr. Velkey’s Annotated virtual slide PowerPoint files
- Dr. Christensen’s Whiteboard drawings PowerPoint files
- Dr. Yamashita’s Summary sheets
- PowerPoint files of lab introduction
- Live lab introduction of PowerPoint files
- Live lecture

Electronic learning tools
- Course website with virtual microscope images (online)
- Streaming of recorded lecture videos
- Sample questions on histology course website
- Dr. Hortsch’s SecondLook PowerPoint files and iPad app
- Dr. Kim’s Review and Look-Alike PowerPoint files

Scheduled learning opportunities
- Faculty-guided laboratory sessions with virtual slides
- Dr. Hortsch’s SecondLook PowerPoint files and iPad app
If students can choose between different equivalent learning resources, what will they choose?

Will their choices always be good for their learning success?

Which learning strategies and resources are used by successful versus struggling learners?
A survey given to the three last Michigan M1 classes and one current dental class after they complete the first year histology module.

The project was funded by a Faculty Investigating Student Learning (ISL) Grant by CRLT.

Personal Background: Type of college degree, previous relevant experience, color blindness.

Use of Histology Resources: Attendance of lectures and labs, use of electronic (lecture videos, webpage, PowerPoint series etc.) and other resources (books, lab guides, handouts etc.) and change thereof over time, students opinion of the most useful resources.

Histology Study Habits: Motivation to learn histology, individual versus group study, amount of time spent on histology and changes thereof.
Logistic and statistical support is provided by collaborator Dr. Joel Purkiss, Office of Student Education/Medical School.

Student collaborator Stephanie Johnson, School of Dentistry, Class of 2015.

Student collaborator Louisa Holaday, Medical School, Class of 2015

Student collaborator Daniel Selvig, Medical School, Class of 2014
146 of 168 students from the Class of 2014 participated in the survey. That corresponds to a participation rate of 86.9%. (Three $70 cash prizes helped)

If students can choose between different equivalent learning resources, what will they choose?
How frequently did you use the following study habits (on average) over the course of the academic year?

Students prefer to learn alone, rather than in study groups. Over the academic year, this study pattern becomes even more predominant.
How frequently did you use the following histology resources and how did this usage change over the course of the academic year?

Although most students still come regularly to lectures, all education offerings that are scheduled at specific times are less and less attended as the course progresses. In contrast, electronic media that can be accessed any time become increasingly used as time progresses.
How frequently did you use the following histology resources and how did this usage change over the course of the academic year?

Electronic learning resources are preferred by students and increasing used over time. Traditional learning resources are abandoned over time.

The least favorite learning resource: The textbook
Do you use the paper LECTURE and LABORATORY handouts, or the online versions of the LECTURE and the LABORATORY handouts?

Students still use paper handouts to take notes during lectures. However, the paper laboratory manual saw little use as the virtual slides are accessible from the course website. Therefore, we discontinued issuing paper laboratory manuals to the students.
• Students strongly preferred learning histology working alone rather than in study groups.

• Students increasingly gravitate to using electronic study tools over most traditional didactic offerings.

• In addition, students report a strong preference for learning opportunities that are not scheduled and restricted to specific times.

• Histology resources that provide immediate and efficient feedback are also highly valued by most students.
Summary of Comparing Dental and Medical Students Learning Histology

- Dental students consider histology as less relevant for their professional career.

ANOVA analysis $p=0.001$
Summary of Comparing Dental and Medical Students Learning Histology

- Dental students consider histology as less relevant for their professional career.
- Dental students view histology as a more difficult study subject than medical students.

ANOVA analysis Before p<0.001
ANOVA analysis After p<0.001
Summary of Comparing Dental and Medical Students Learning Histology

• Dental students consider histology as less relevant for their professional career.

• Dental students view histology as a more difficult study subject than medical students.

• Dental students report a higher classroom attendance than medical students (mandatory lecture attendance).  

P-value = 0.0152
Summary of Comparing Dental and Medical Students Learning Histology

- Dental students consider histology as less relevant for their professional career.
- Dental students view histology as a more difficult study subject than medical students.
- Dental students report a higher classroom attendance than medical students (mandatory lecture attendance).
- Dental students are more likely to work in study groups.

Study alone ANOVA analysis $p<0.001$
Study with others ANOVA analysis $p=0.007$
Summary of Comparing Dental and Medical Students Learning Histology

- Dental students consider histology as less relevant for their professional career.
- Dental students view histology as a more difficult study subject than medical students.
- Dental students report a higher classroom attendance than medical students (mandatory lecture attendance).
- Dental students are more likely to work in study groups.
- Dental students make less use of out-of-classroom learning opportunities (especially the Michigan Dental Histology website)

ANOVA analysis p=0.0004
Summary of Comparing Dental and Medical Students Learning Histology

- Dental students consider histology as less relevant for their professional career.
- Dental students view histology as a more difficult study subject than medical students.
- Dental students report a higher classroom attendance than medical students (mandatory lecture attendance).
- Dental students are more likely to work in study groups.
- Dental students make less use of out-of-classroom learning opportunities (especially the Michigan Dental Histology website).
- Both dental and medical students like to use electronic resources that provide efficient feedback.
Which learning strategies and resources are used by successful versus struggling learners?


449 of 506 students from the three last M1 classes participated in the survey. That corresponds to a participation rate of 88.7%.

(Three or four $70 cash prizes helped)

Things we asked and for which found no statistically significant correlation with histology quiz/exam scores:

Work in a research lab during the last 5 years, time since graduating from college, member of the MSTP program, color blindness, studying for histology alone or in a group, time of study outside the class room.
What was your undergraduate major?

Students with a biomedical college degree do statistically better than students with a non-science major.

ANOVA analysis $p < 0.001$
How relevant do you think the M1 Histology course content is to your future career as a physician?

Students, who think that histology will be relevant for their future career as physician do statistically better.

ANOVA analysis $p = 0.002$
Students perform better in histology examination if they attend faculty-guided learning experiences.

<table>
<thead>
<tr>
<th>How frequently did you use the following resources?</th>
<th>Never</th>
<th>Rarely</th>
<th>Moderately</th>
<th>Frequently</th>
<th>Always</th>
<th>OVERALL</th>
<th>ANOVA Analysis</th>
<th>Tukey's B Post-Hoc Tests</th>
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</thead>
<tbody>
<tr>
<td>Attendance at laboratory introduction presentations in person.</td>
<td>88.35 (5.72) 90</td>
<td>88.2 (6.18) 125</td>
<td>87.29 (6) 52</td>
<td>87.88 (6.35) 80</td>
<td>90.1 (5.15) 97</td>
<td>88.48 (5.93) 444</td>
<td>F=2.66, p=0.032*</td>
<td>'Always' and 'Moderately' groups differ significantly.</td>
</tr>
<tr>
<td>Studying the laboratory introduction PowerPoint files outside of the laboratory session.</td>
<td>89.39 (5.33) 64</td>
<td>89.29 (5.79) 84</td>
<td>88.34 (5.88) 60</td>
<td>86.88 (6.71) 80</td>
<td>88.55 (5.73) 156</td>
<td>88.48 (5.93) 444</td>
<td>F=2.27, p=0.061</td>
<td>n/a</td>
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<tr>
<td>Work on laboratory assignments in person, during lab hours after the lecture.</td>
<td>89.08 (5.42) 144</td>
<td>87.19 (6.09) 132</td>
<td>88.98 (5.62) 57</td>
<td>88.16 (6.96) 54</td>
<td>90.03 (5.38) 56</td>
<td>88.51 (5.9) 443</td>
<td>F=3.1, p=0.015*</td>
<td>'Always' and 'Rarely' groups differ significantly.</td>
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<tr>
<td>Work on laboratory assignments outside of laboratory hours.</td>
<td>87.79 (5.09) 44</td>
<td>88.94 (5.93) 74</td>
<td>88.52 (6.19) 87</td>
<td>87.59 (6.18) 98</td>
<td>89.05 (5.82) 141</td>
<td>88.48 (5.93) 444</td>
<td>F=1.14, p=0.335</td>
<td>n/a</td>
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</table>
Attending Lectures versus Video Watching

Students, who attend lectures in person, do statistically better in quizzes and exams.

Students, who rely on lecture videos, do statistically worse in exams.
Summary slide

• Students’ college major (non science vs. biomedical science) and previous histology experience correlates positively with histology examination success.

• Motivation to learn histology (it is important for my career) is highly correlated with histology examination success.

• Students perform better in examination if they attend faculty-guided learning experiences.

• Histology exam success is highly correlated with always attending live lectures. Students who rely on streaming lectures as podcasts do significantly worse answering histology examination questions.
The Influence of Classical and Electronic Educational Resources on Students’ Learning Success in the First Year Medical School Histology Component at the University of Michigan

Holaday et al. in Medical Science Educator (2013). Vol. 23(4), pages 607-619. (Journal of the International Association of Medical Science Educators)

Learning Histology – Dental and Medical Students’ Study Strategies

Johnson et al., revised manuscript submitted to the European Journal of Dental Education.

Correlating Students’ Educational Background, Study Habits and Resource Usage with Learning Success in Medical Histology

Selvig et al., revised manuscript submitted to Anatomical Sciences Education. (Journal of the American Association of Anatomists)