Introducing fundamental microscopy skills in a “stage wise” manner to first year biology students

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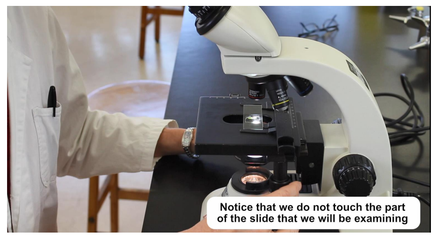
Abstract

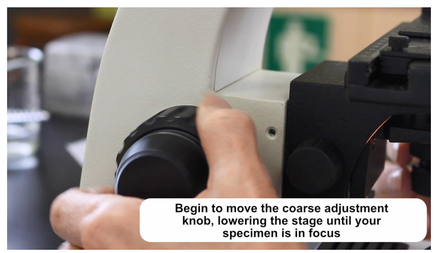
The microscope is an ubiquitous tool in the undergraduate biology laboratory. Implementing a hierarchical approach, students were introduced to skills in microscopy. Initially, students attempted to locate and examine a specimen on a prepared slide. Subsequently, students employed the microscope to recognize and describe the stages of mitosis in plant cells, observing particular features for each phase in onion (*Allium*) root tip. During the session, students created a wet mount with Brown planaria (*Dugesia tigrina*) and practiced using the microscope to observe live organisms. While developing skills in microscopy, parallel laboratory activities also included creating scientific illustrations and quantifying the proportion of cells in each stage of the cell cycle, integrating research skills (gathering, analyzing, interpreting data) as part of the exercise.

In addition, we have adapted peer-to-peer teaching, where upper year students created a video microscopy tutorial. This supplemental resource provided first year students with an overview of the standard procedures and key components of a microscope. After reviewing the video, a majority of biology students felt more confident and comfortable using a microscope and more aware of practices which contribute to improper use. Coupling in-laboratory and online resources promoted student development of practical techniques.

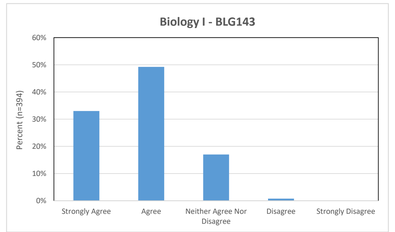
Objectives

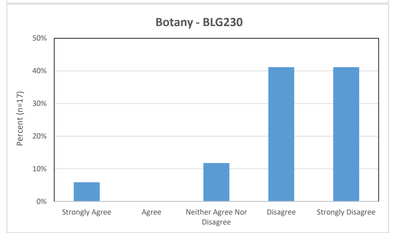
- To be able to properly use a microscope
- Be able identify all parts of a microscope
- To be able to find and examine a specimen on a prepared slide
- To be able to describe and recognize the stages of mitosis in plant cells
- To be able to quantify and represent graphically the proportion of cells in each stage of the cell cycle
- To practice use of your microscope for observing live organisms
- To observe the structures of the planaria



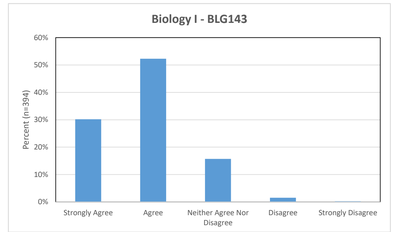


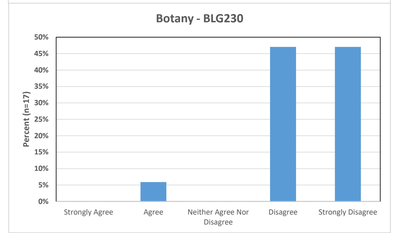
After viewing the video, I feel more confident and comfortable with using a microscope in the laboratory.



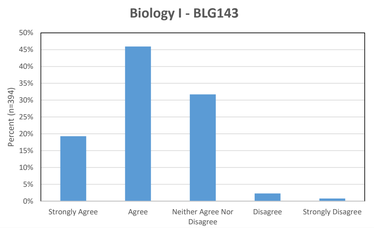


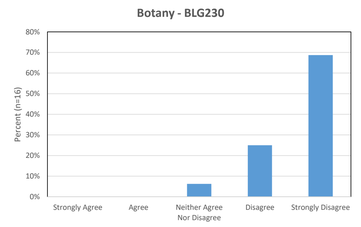
After reviewing the video, I am more aware of practices which contribute to improper use of the microscope.





After viewing the video, I feel more confident and comfortable with setting up a wet mount in the laboratory.





Conclusions

- Student performance (based on grades) in the laboratory component in first and second year biology courses (Fall 2018) was higher with supplemental resources compared to previous offerings (Fall 2017).
- 0.42% of the class failed the course simply due to non-attendance of the laboratory component, however there was still a high withdrawal rate (15%, fall 2018) consistent with previous offerings (16.4%, fall 2017).
- Based on the observations and feedback, further videos may be produced to cover other topics related to the laboratory component.

Acknowledgements

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