

12-4-2015

The Impact of a Flipped Classroom Compared to Lecture-Based Teaching on Achieving Course Outcomes

Victoria Bumgardner

Cedarville University, victoriabumgardner@cedarville.edu

Caleb Tang

Cedarville University, ctang@cedarville.edu

Jasmine Gunti

Cedarville University, rjgunti@cedarville.edu

Akwasi Appiah

Cedarville University, akwasiowusuappiah@cedarville.edu

Melissa J. Beck

Cedarville University, mbeck@cedarville.edu

Follow this and additional works at: [http://digitalcommons.cedarville.edu/
pharmacy_nursing_poster_session](http://digitalcommons.cedarville.edu/pharmacy_nursing_poster_session)

 Part of the [Education Commons](#), and the [Pharmacy and Pharmaceutical Sciences Commons](#)

Recommended Citation

Bumgardner, Victoria; Tang, Caleb; Gunti, Jasmine; Appiah, Akwasi; and Beck, Melissa J., "The Impact of a Flipped Classroom Compared to Lecture-Based Teaching on Achieving Course Outcomes" (2015). *Pharmacy and Nursing Student Research and Evidence-Based Medicine Poster Session*. 72.

http://digitalcommons.cedarville.edu/pharmacy_nursing_poster_session/72

This Poster Session is brought to you for free and open access by DigitalCommons@Cedarville, a service of the Centennial Library. It has been accepted for inclusion in Pharmacy and Nursing Student Research and Evidence-Based Medicine Poster Session by an authorized administrator of DigitalCommons@Cedarville. For more information, please contact digitalcommons@cedarville.edu.

The Impact of a Flipped Classroom Compared to Lecture-Based Teaching on Achieving Course Outcomes

Akwasi Appiah, Victoria Bumgardner, Jasmine Gunti, Mouhannad Saad, Caleb Tang, Melissa Beck, Ph.D.
Cedarville University School of Pharmacy



Statement of Problem

Background

- Passive Learning is based on lecturing while Active Learning involves student participation.¹
- Team-Based Learning (TBL) uses a small-group structure as a method of active learning to engage students.²
- Flipped classroom is a form of active learning that requires student preparation prior to class and an assessment at the beginning of class.³
- This project examines the effect of the change from a hybrid model of passive learning with TBL to a flipped classroom model on course outcomes in a Medicinal Biochemistry class taught at the Cedarville University School of Pharmacy.

Significance of the Problem

- To address the gap in research concerning the efficacy of complete active learning with a flipped classroom compared to a hybrid of active and passive learning.

Objectives and Hypotheses

To determine the efficacy of flipped classroom with TBL on the learning outcomes of students in a graduate level biochemistry course.

H_0 - The implementation of flipped classroom with TBL will not have an effect on student performance on course objectives in a graduate level biochemistry course.

H_a - The implementation of flipped classroom with TBL will have an effect on student performance on course objectives in a graduate level biochemistry course.

Methods

- Study Design
 - Case control – Control group is passive learning cohort and the case cohort undergoes active learning via flipped classroom
 - Alpha=0.05
- Sample
 - Medicinal Biochemistry students fall of 2013-2016
 - 48 students in 2013
 - 35 students in 2014
 - 41 students in 2015
 - ~50 students in 2016
- Data Collection and Storage
 - Data entered into SPSS Statistics and Microsoft Excel spreadsheets
 - Survey development and administration via Qualtrics
- Measurement
 - SPSS will be used for calculations
 - Utilize a survey to assess demographic information for each student
- Survey
 - Sent to all students via email
 - Developed by the investigators to assess correlations or identify confounding factors in the findings from the exam score data

Learning Methodologies Flowchart

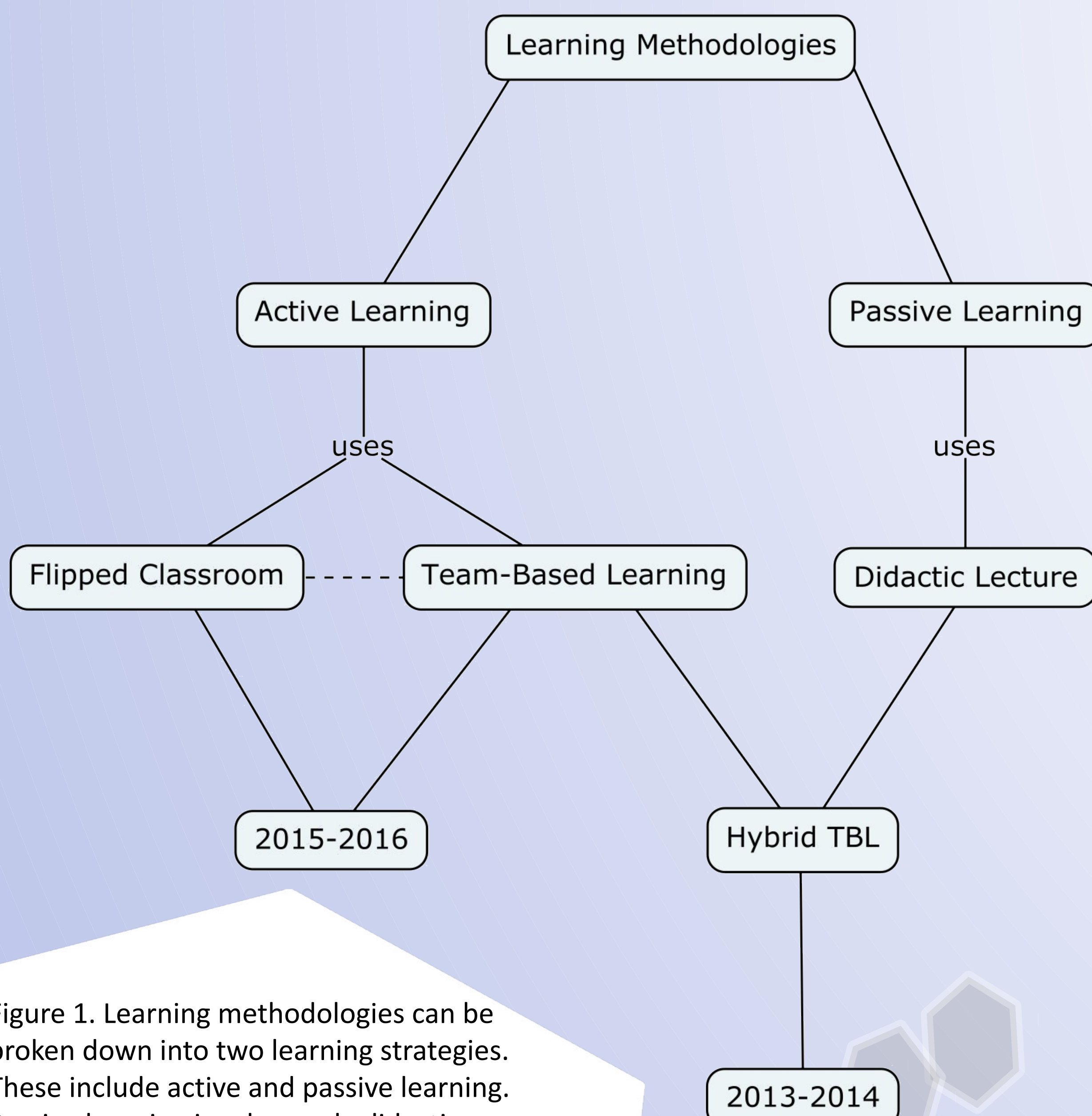


Figure 1. Learning methodologies can be broken down into two learning strategies. These include active and passive learning. Passive learning involves only didactic lecture. Two types of active learning are team-based learning and the flipped classroom method of teaching. The 2013-2014 cohorts of students learned by a hybrid of didactic lecture and TBL. The 2015-2016 cohorts of students learned using both types of active learning, both TBL and flipped classroom.

Survey Questions

Did you complete your undergraduate studies at Cedarville?	Are you a procrastinator?
What was your overall undergraduate GPA?	Do you prefer active learning or passive learning? Please explain.
What is your gender?	Which program were you enrolled in when you took Medicinal Biochemistry?
How old were you when you took biochemistry?	Do you prefer paper-based or electronic testing?
What was your average overall grade in Organic Chemistry I and II?	

Future Direction and Timeline

Implementation of flipped classroom in multiple classes simultaneously would be recommended to determine efficacy on a broad scale



References

1. Tan N, Kandiah N, Chan Y, Umaphathi T, Lee S, Tan K. A controlled study of team-based learning for undergraduate clinical neurology education. BMC Medical Education [serial online]. October 30, 2011;11:91. Punja D, Kalludi S, Pai K, Rao R, Dhar M. Team-based learning as a teaching strategy for first-year medical students. Australasian Medical Journal [serial online]. December 2014;7(12):490-499.
2. Punja D, Kalludi S, Pai K, Rao R, Dhar M. Team-based learning as a teaching strategy for first-year medical students. Australasian Medical Journal [serial online]. December 2014;7(12):490-499.
3. Velegol SB, Zappe SE, Mahoney E. The evolution of a flipped classroom: Evidence-based recommendations. Advances in Engineering Education. 2015;4(3):1-37.

Analysis

- Independent t-test to compare mean results between the combined 2013 and 2014 class versus the combined 2015 and 2016 class
- One-way ANOVA to compare 4 classes: 2013, 2014, 2015, and 2016
- Two-way ANOVA for comparison of multiple factors for mean differences among the dependent variable (exam and assessment scores)
- ANCOVA to study the independent variable with and without covariates
- Descriptive statistics will be used to easily sort, organize, and filter exam and RAT results based on survey answers. This allows for flexibility in isolating different factors that are also contributing to the findings of the study

Limitations

Point Biserial – some questions were removed
Exam 2 from 2015 class – confounding due to aberrant testing conditions
Exam style – change in exam medium from paper-based to electronic using ExamN program

Acknowledgements

We would like to thank Dr. Melissa Beck for advising the project and Dr. Aleda Chen for additional guidance.