

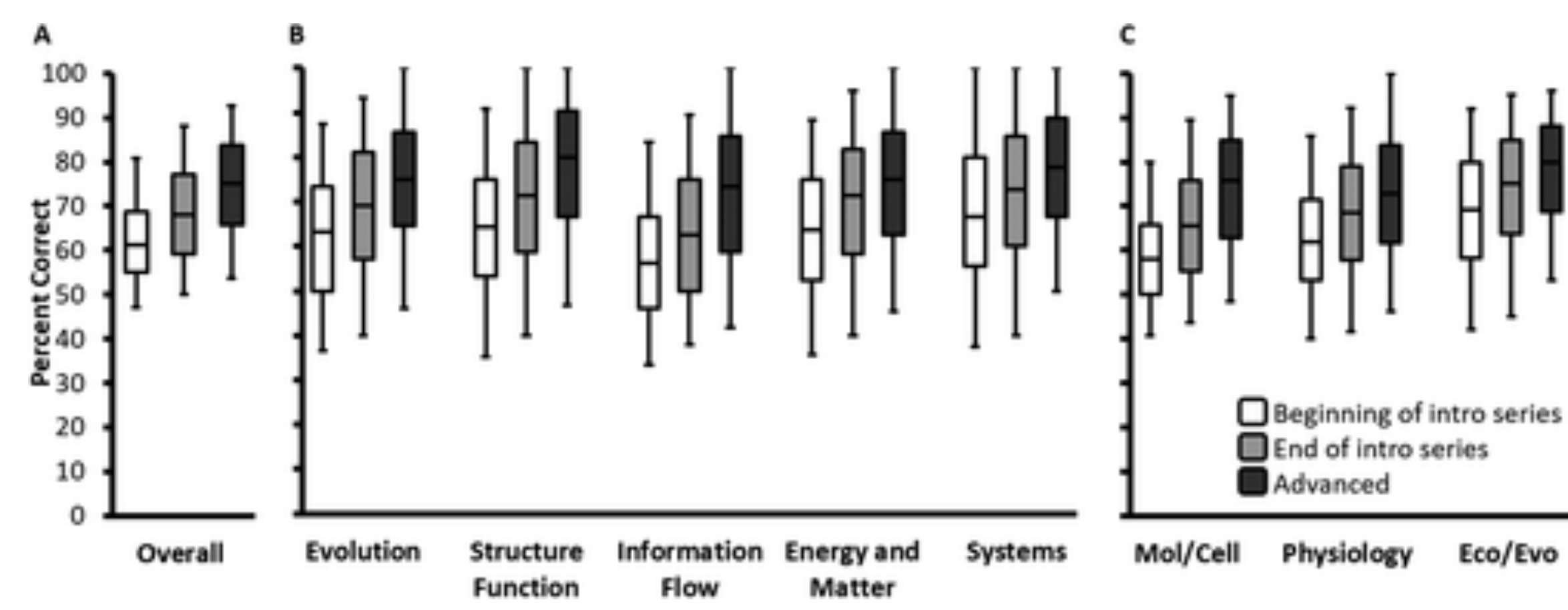
Lindenwood General Biology-Measuring Achievement and Progression in Science (GenBio-MAPS)

Diego De Gregorio, Madilyn Waters, and Robyne Elder (Ed.D.)
College of Science, Technology, and Health, Lindenwood University

Introduction

The General Biology-Measuring Achievement and Progression in Science (GenBio-MAPS) serves as a tool for monitoring and directing departmental progress by assessing student comprehension throughout the duration of undergraduate biology programs (Couch et al., 2019).

According to the Vision and Change national report, a biology student should have a firm grasp of the concepts of (1) evolution, (2) structure and function, (3) information flow, exchange, and storage, (4) pathways and transformations of energy and matter, and (5) systems (Aguirre et al., 2013).



*Graph from Couch, B.A., Wright, C. D., Freeman, S., Knight, J. K., Semsar, K., Smith, M. K., Summers, M. M., Zheng, Y., Crowe, A. J., Brownell, S. E. (2018). GenBio-MAPS: A programmatic assessment to measure student understanding of vision and change core concepts across general biology programs. CBE Life Science Education, DOI:10.1187/cbe.18-07-0117.

Methods

Lindenwood Biology students were surveyed (Qualtrics) three different times using a multiple-true-false (MTF) format - each prompt being an independent true-false (T-F) question (75) that branches from one biological scenario (15). Students also answered a set of demographic questions at the end of the survey. (Questions were randomized with each administration to minimize item-order effects.)



Procedures

Students completed the survey during class time and were compensated with extra credit (at the discretion of the instructor).

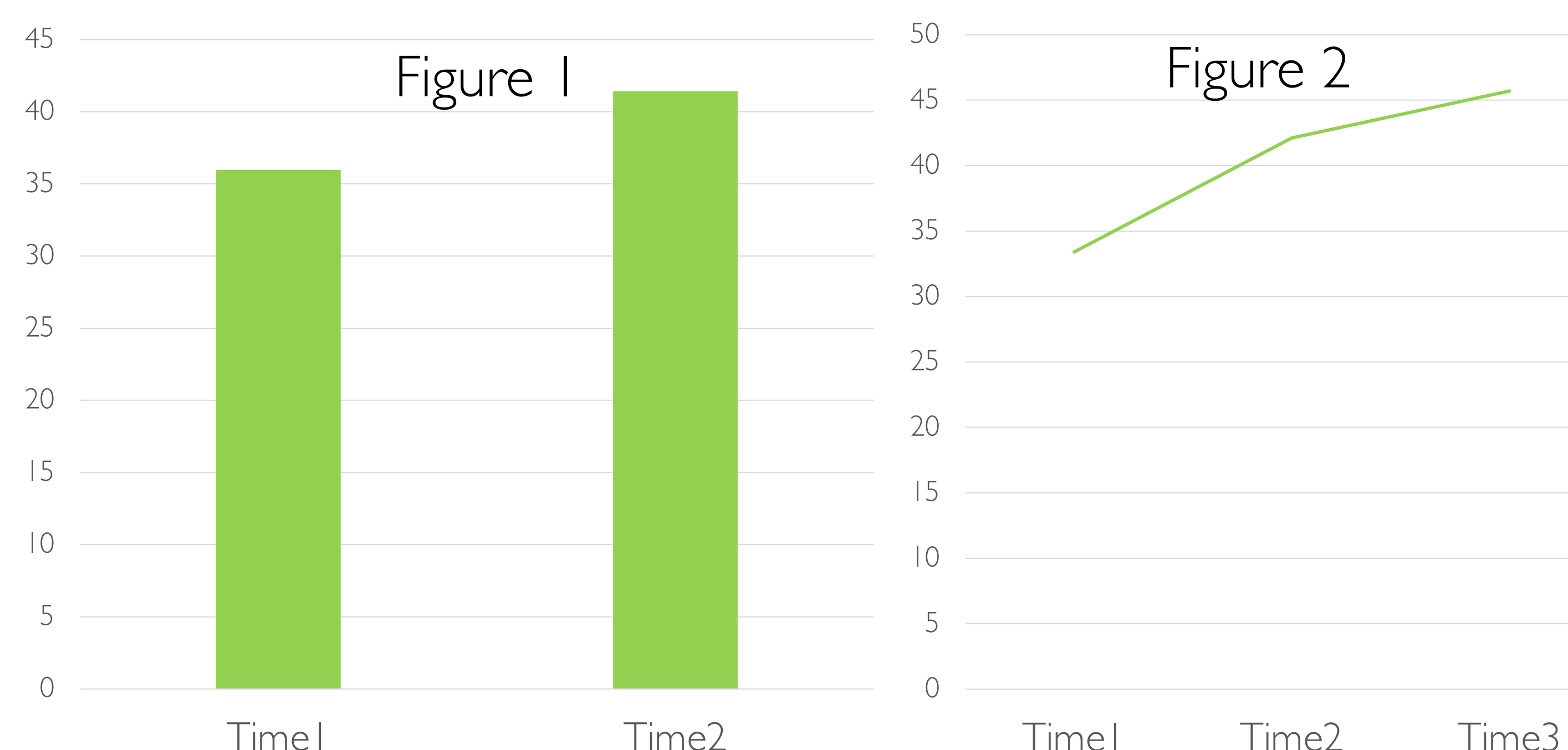
Before conducting our data analysis, we applied a filter process in order to reach a target population, i.e., removing incomplete survey submissions, survey completion in < 10 min, and participants with < 3 total submissions,

	Mean	Std. Deviation	N
Time1	33,4	13,55811	10
Time2	42,1	5,78216	10
Time3	45,7	8,314	10

Preliminary results

A repeated measures ANOVA was conducted (Fig.2) and found that the scores between the first-time takers ($M = 33.4$, $SD = 13.56$), and third-time takers ($M = 45.7$, $SD = 8.31$), was significantly different, $F(2, 18) = 4.943$, $p = .019$; $n^2 = .355$ (medium effect). Second-time takers ($M = 42.1$, $SD = 5.78$) did not differ significantly.

Additionally, a related samples t -Test was conducted (Fig.1) and found that first-time takers ($M = 35.96$, $SD = 10.68$) was significantly different than second-time takers ($M = 41.43$, $SD = 7.36$; $t(53) = -3.49$, $p < .001$, $d = -.48$ (medium).



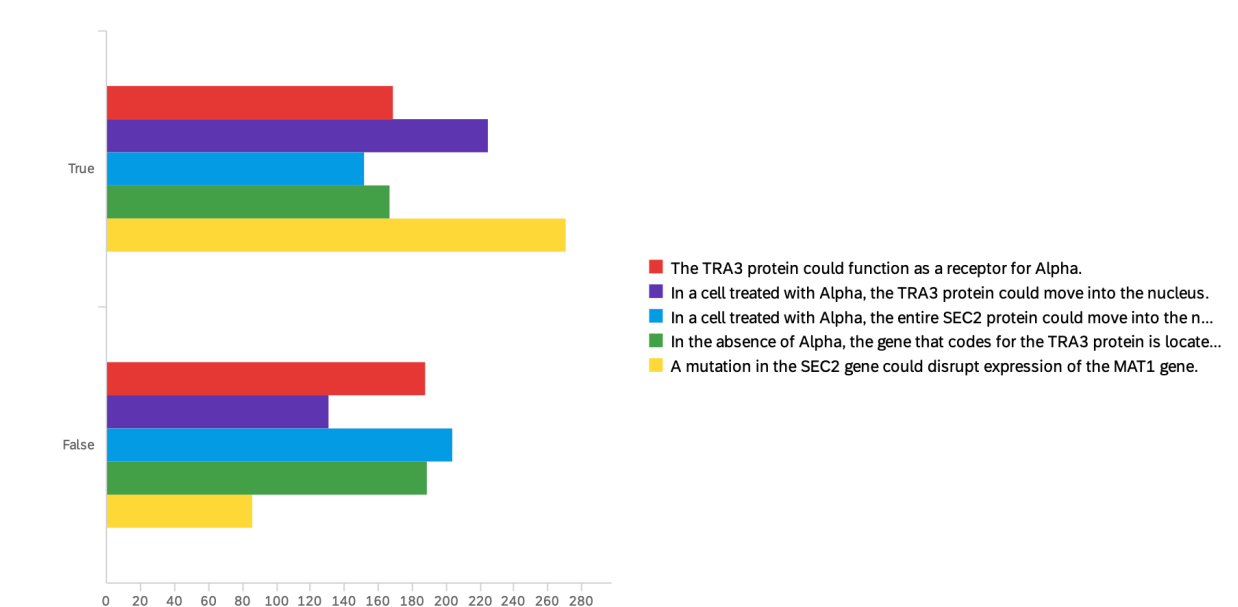
Results



Full paper

Discussion

As seen in the results section, preliminary findings suggest an upward trend in student comprehension throughout the duration of the biology undergraduate program. However, data from the preliminary stages of the experimentation ($n = 10$) should not be considered significant given the small sample size. However, this is the first study that monitors departmental progress in undergraduate biology programs at Lindenwood University.



References

- Aguirre K. M., Balsler T. C., Jack T., Marley K. E., Miller K. G., Osgood M. P., Romano S. L. (2013). PULSE Vision & Change rubrics. CBE—Life Sciences Education, 579–581.
- Couch, B. A., Wright, C. D., Freeman, S., Knight, J. K., Semsar, K., Smith, M. K., Summers, M. M., Zheng, Y., Crowe, A. J., Brownell, S. E. (2018). GenBio-MAPS: A programmatic assessment to measure student understanding of vision and change core concepts across general biology programs. CBE Life Science Education, DOI:10.1187/cbe.18-07-0117.

