



# FIRST YEAR ENGINEERING STUDENTS' IDENTIFICATION OF MODELS IN ENGINEERING

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## RESEARCH QUESTIONS

1. What types of models do first-year engineering students identify?
2. How do students' responses compare across different courses: EGR 120 - a graphical communications course and EGR 115 - a programming course?

## BACKGROUND

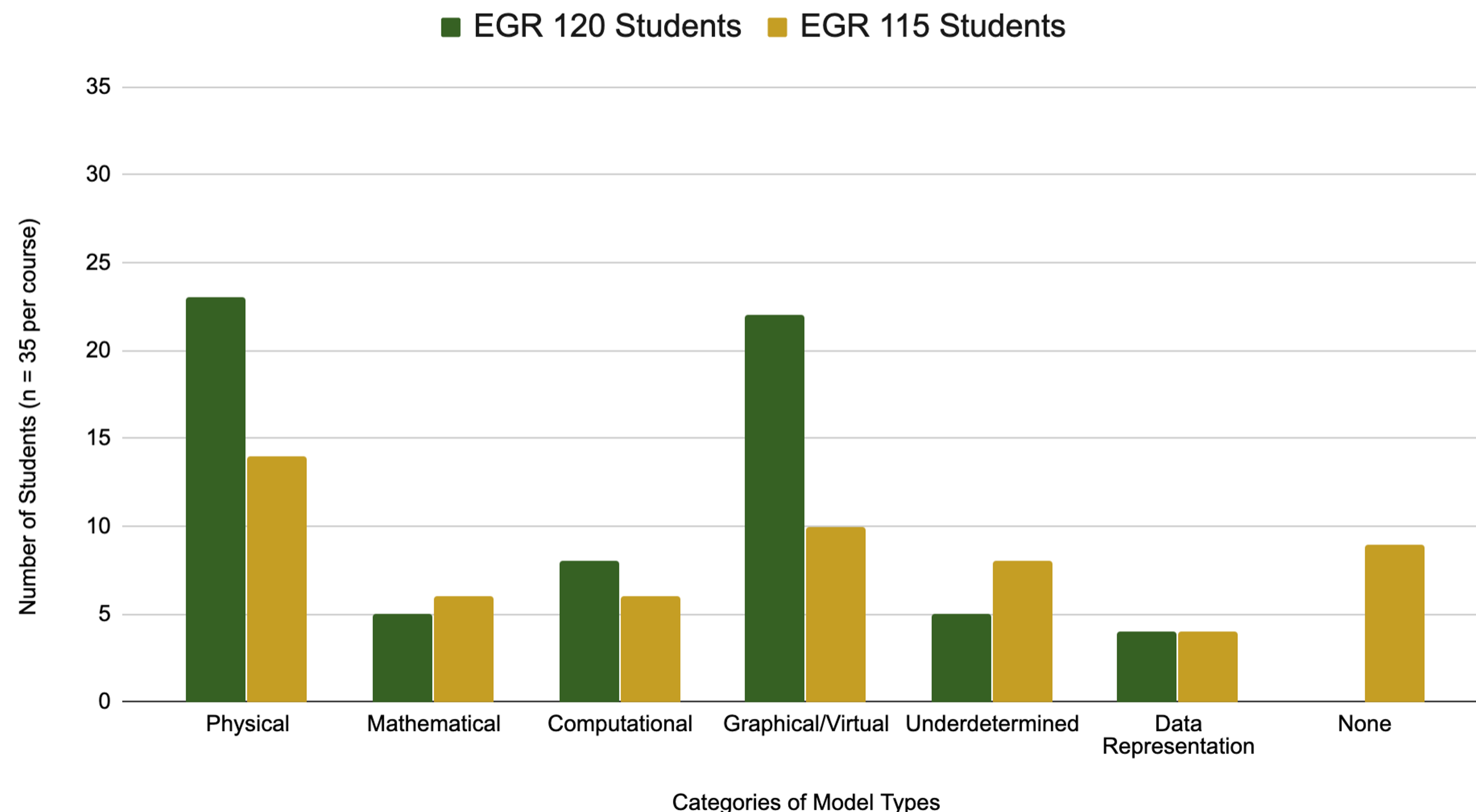
In order to succeed in engineering careers, students must be able to create and apply models to certain problems. Some different types of models are physical, virtual/graphical (CAD), mathematical, and computational models. However, many students struggle to identify, create, and apply relevant models in their engineering courses

## METHODS

Through two introductory first-year engineering courses, EGR 115 and EGR 120, students' responses to a survey about modeling were qualitatively analyzed. The survey was given at the beginning and the end of the courses. The Fall 2019 data analyzed consisted of 560 pre and post surveys for EGR 115 and 384 pre and post surveys for EGR 120. Through the surveys, the team looked at how students identify models and how they would apply them before the classes and after the classes.

## PRELIMINARY RESULTS

### Preliminary Results: Types of Models Identified by First-Year Engineering Students



## CONCLUSIONS

There is clearly a difference of answers respective to each class. Out of the EGR 115 students that identified models, they had more variety in the types of models. All EGR 120 students identified models, but the majority discussed Graphical/Virtual and Physical models. This emphasis could be related to the fact that EGR 120 is a graphical communications class focused on drawings and CAD models.



## REFERENCES

- A. R. Carberry and A. F. McKenna, "Exploring student conceptions of modeling and modeling uses in engineering design," *Journal of Engineering Education*, vol. 103, no. 1, pp. 77-91, 2014.
- R. Lesh, H. M. Doerr, G. Carmona, and M. Hjalmarson, "Beyond constructivism," *Mathematical thinking and learning*, vol. 5, no. 2-3, pp. 211-233, 2003.
- K. J. Rodgers, J. C. McNeil, M. A. Verleger, and F. Marbouti, "Impact of a modeling intervention in an introductory programming course," presented at the 2019 ASEE Annual Conference & Exposition Tampa, Florida, 2019.
- J. S. Zawojewski, H. A. Diefes-Dux, and K. J. Bowman, *Models and modeling in engineering education: Designing experiences for all students*. Sense Publishers, 2008.

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