

***USING EDUCATIONAL COMICS TO PROMOTE
STUDENT INTEREST IN THE BREADTH AND
DEPTH OF CHEMICAL ENGINEERING***

.....

ASEE 2024 National Conference

Northeastern University Chemical Engineering Dept.

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BACKGROUND : INSTITUTIONAL ENROLLMENT

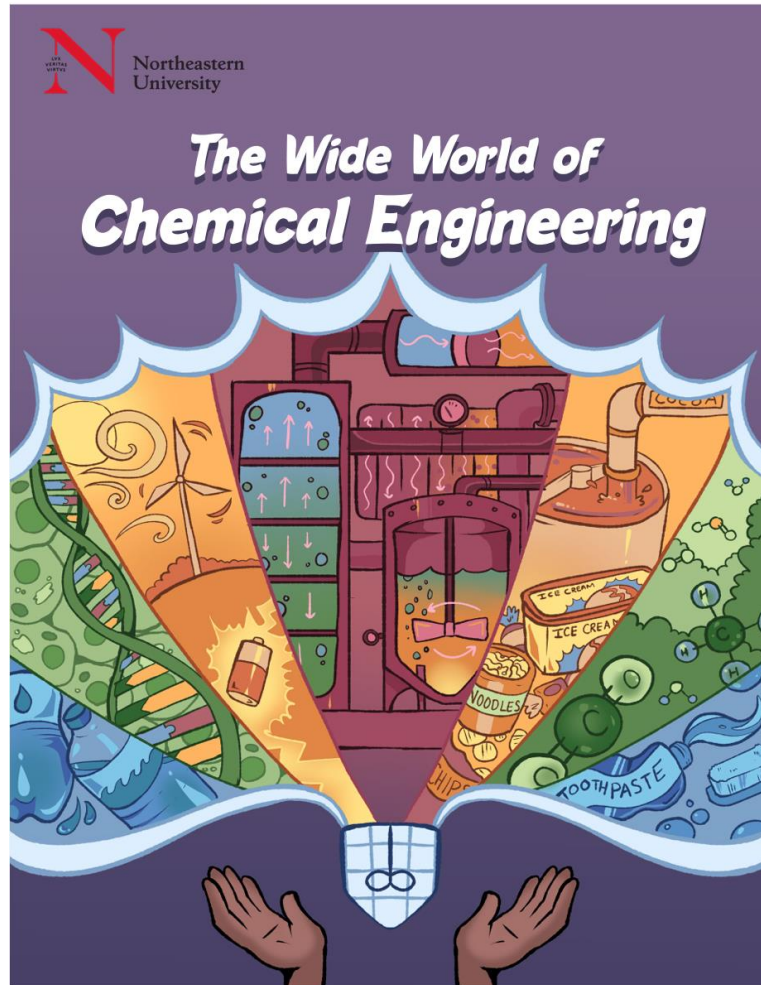
Perception of Chemical Engineering :
- Chemistry & Math
- Restrictive

10.4% decrease in undergrad
enrollment in 2020

5-year decline of 29.1%
in graduate enrollment

**How can students be encouraged to
pursue futures in chemical engineering?**

...MOTIVATING STUDENTS THROUGH COMICS



The following comic has been developed to:

1. Effectively explain post-grad opportunities in Chemical Engineering
2. Encourage student pursuit in Chemical Engineering

WHY COMICS?

1

Greater Student Engagement



2



Enhanced Retention & Recall

3

Improved Understanding



4



Accessible & Digestible

D. Septialti, Z. Shaluhayah, and B. Widjanarko, "The Effectiveness of Using Comics in Efforts to Increase Adolescent Health Knowledge: A Literature Review," *Jurnal Aisyah : Jurnal Ilmu Kesehatan*, vol. 7, no. S1, Jul. 2022, doi: <https://doi.org/10.30604/jika.v7is1.1134>.

D. Dewantara, "The influence of educational comics on the concept of static electricity toward student's learning outcomes and communication skills," *THABIEA : JOURNAL OF NATURAL SCIENCE TEACHING*, vol. 3, no. 1, p. 20, Jun. 2020, doi: <https://doi.org/10.21043/thabiea.v3i1.6894>.

S. Khoiriyah and N. Suprpto, "Effectiveness of Comics to Train Students' Critical Thinking Skills in Physics Learning: A Mini-Review," *Studies in Learning and Teaching*, vol. 2, no. 1, pp. 5–15, Jan. 2021, doi: <https://doi.org/10.46627/silet.vi.49>.

Wang, Zezhong, et al. "Comparing Effectiveness and Engagement of Data Comics and Infographics." *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 2 May 2019, <https://doi.org/10.1145/3290605.3300483>.

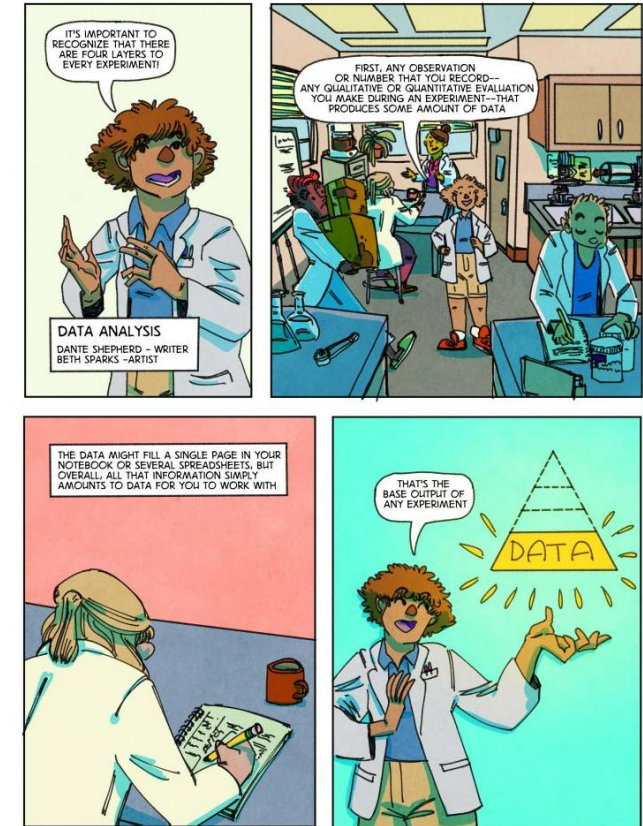
PREVIOUS STUDIES : EFFICACY OF COMICS IN EDUCATION

“Uncertainty” & “Data Analysis”

- Student feedback indicated:
 - 94% more confident
 - Average grade:
 - 83% → 86%
- Demonstrated efficacy of comics in classrooms



produced by Dr. Lucas Landherr through a Provost Advancing Undergraduate Teaching and Learning Grant at Northeastern University



Northeastern

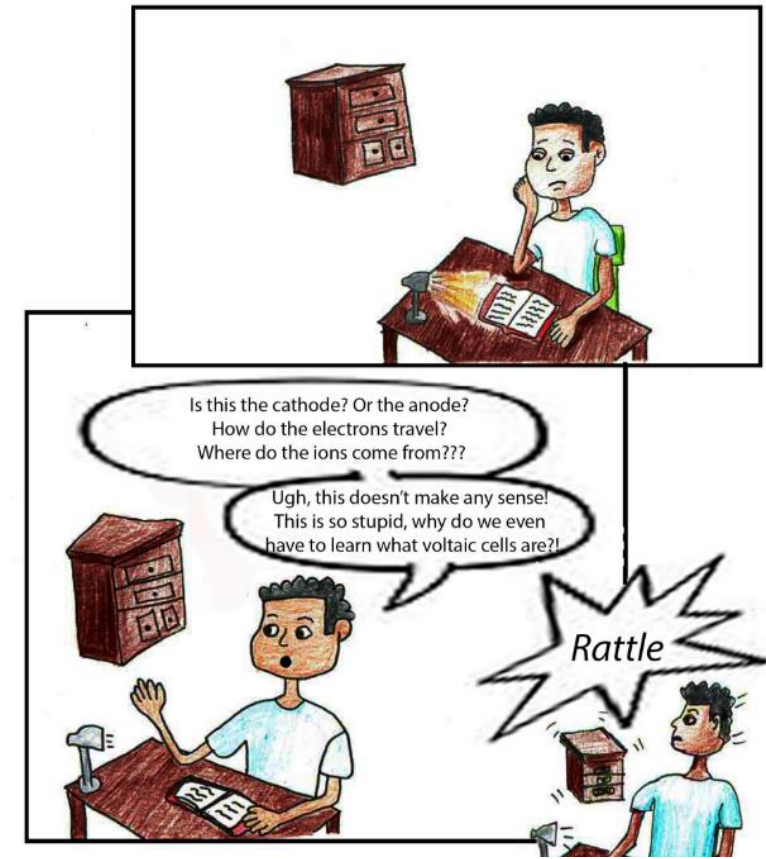
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PREVIOUS STUDIES : FOUNDATION FOR LEARNING

“The Use of Comics To Educate K-12 Students on Voltaic Cells”

- *80% enjoyed reading the comic*
 - *varied engagement*
 - *little to no retention*

Suggested comics maximize effectiveness when readers have reason for engagement



METHODS : COMIC DEVELOPMENT & DISTRIBUTION

- Illustrated opportunities in material science, drug delivery, etc
 - Distributed to first-year engineering students

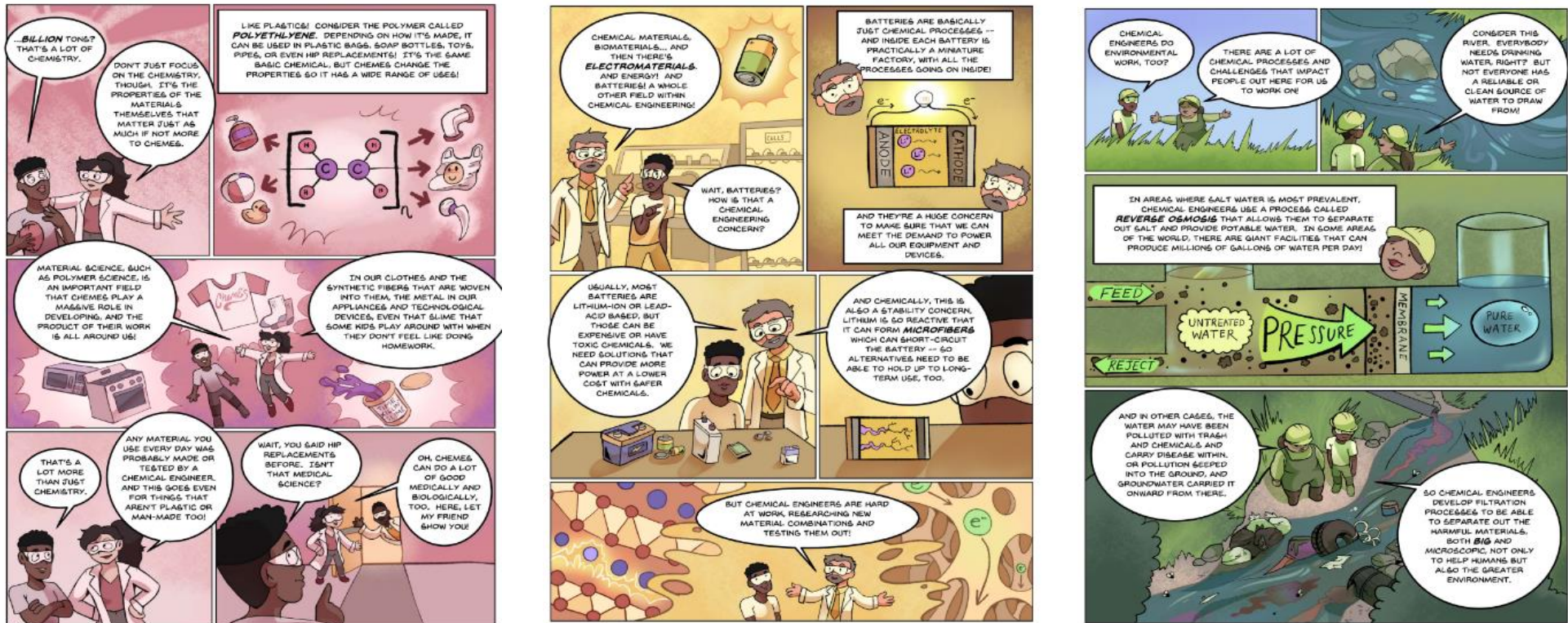


Figure 2: Example Pages from "Using Educational Comics to Promote Student Interest in the Breadth and Depth of Chemical Engineering."

METHODS : ASSESSMENT CRITERIA

FELDER SOLOMAN INDEX OF LEARNING STYLE

Participants were asked to rank their preference for visual, verbal, global, & sequential tool

COMIC COMPREHENSION

Participants were asked to evaluate their level of comprehension on a 1-5 Likert scale

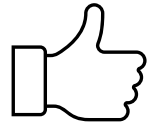
SPAN OF DISTRIBUTION

BROAD DISTRIBUTION

Distributed to LinkedIn, global reach & requests for international curriculum integration



153K



1500



61

“ An incredible and wonderful simplified illustration of Chemical Engineering as a profession. ”

“ Love this comic! It brilliantly captures the essence of chemical engineering is all about - the perfect blend of science, creativity, and problem-solving ”

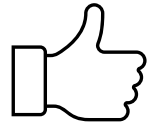
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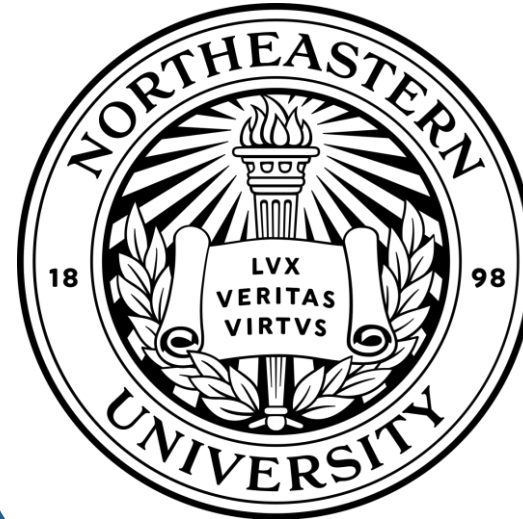
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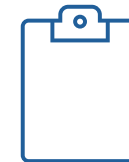
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STUDY DISTRIBUTION

Direct incorporation to first-year engineering curriculum via Academic Advising & Cornerstone of Engineering Course



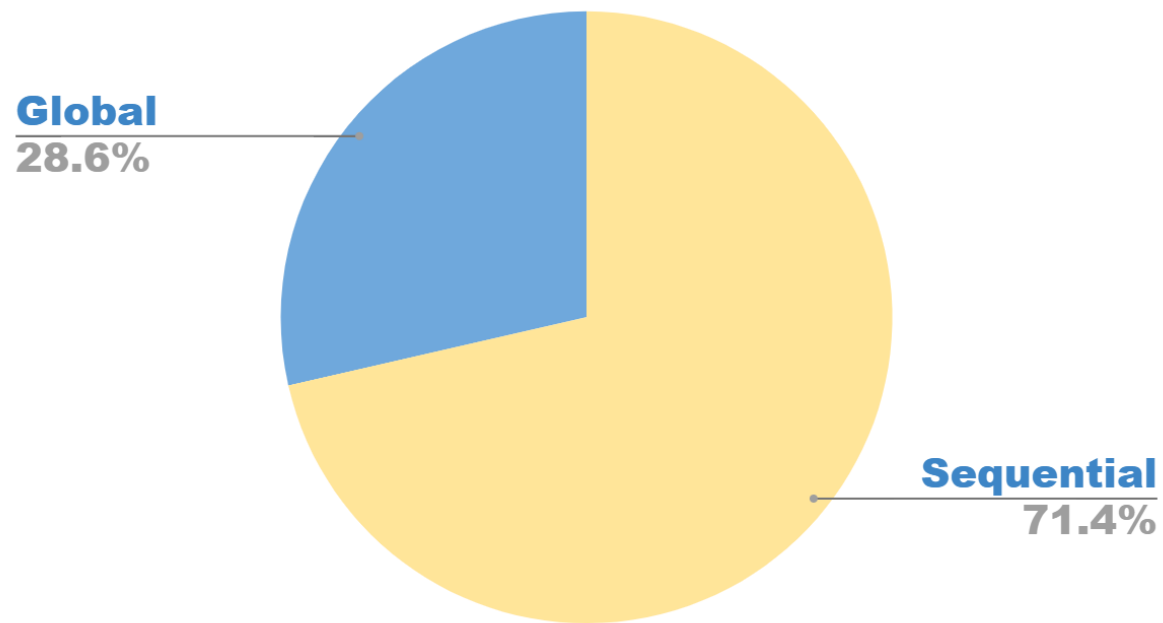
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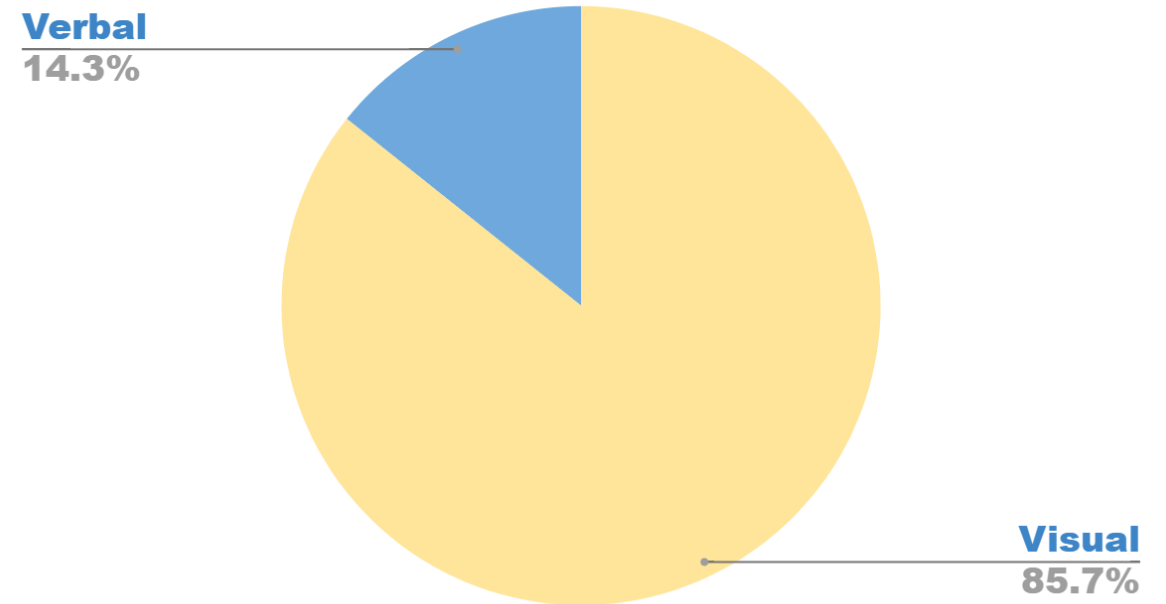
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RESULTS : FELDER SOLOMAN SURVEY

Global vs. Sequential

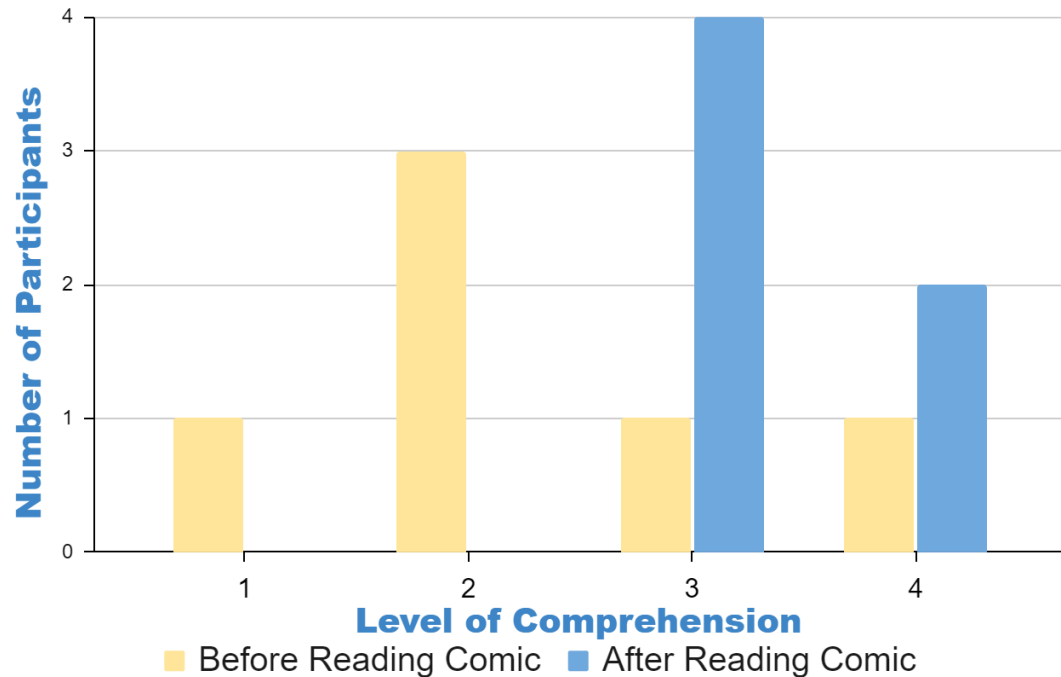


Visual vs. Verbal

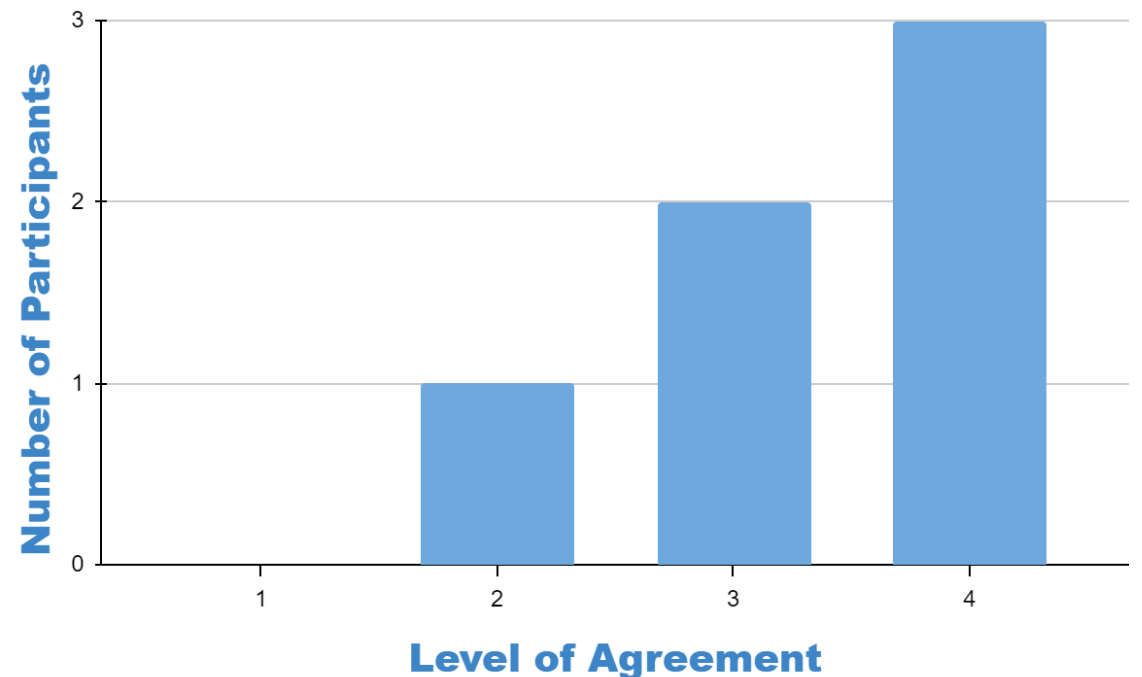


RESULTS : COMIC COMPREHENSION

Participants asked to evaluate their comprehension of the comic before and after reading the comic



Participants were asked to evaluate their level of agreement with comics being effective educational tools



RESULTS : VERBAL FEEDBACK

When asked what participants thought of the comic:

“ provided information on the subject in a concise easy to understand manner ”

When asked what resonated with participants:

“ The goal of making a difference while enjoying science and math ”

FUTURE WORK

1

Translation to Other Languages



2



MUSIC Model of Motivation

3

Younger Demographic



4



Follow-up on Long-Term Effects

CONCLUSION

Comics are an effective educational tool that can

- improve understanding
- encourage engagement
- motivate student involvement

Further development will include:

1. Adapting to wider audiences
2. Gathering more feedback



ACKNOWLEDGEMENTS

Thank you to AIChE Foundation, AIChE K-12 Committee, AIChE's Doing a World of Good initiative, Northeastern University Provost, Dr. Luke Landherr and Monica Kessler for their continued support and involvement in this research.



THANK YOU!
QUESTIONS?