

INTRODUCTION

TO A SPECIAL SECTION ON

THE 2022 ASEE/AICHE CHEMICAL ENGINEERING SUMMER SCHOOL

Milo D. Koretsky,¹ Daniel Burkey,² and Allison Godwin³

1. Tufts University • Medford, MA 02155

2. University of Connecticut • Storrs, CT 06269

3. Cornell University • Ithaca, NY 14853

CHEMICAL ENGINEERING SUMMER SCHOOL IN CEE

The ASEE/AICHE Chemical Engineering Summer School (ChESS) holds a significant legacy within the chemical engineering education community.^[1,2,3] The week-long workshop centers around professional development of early-career faculty, both tenure-track and fixed-term instructional faculty, often within the initial five years of their roles. Additionally, ChESS serves as a hub for experienced faculty to exchange evolving pedagogical methods, technological advancements, and approaches for fostering social support. The core of the programming includes workshops on course content, pedagogical practices, and diversity, equity, and inclusion (DEI), most of which are delivered by volunteers from the chemical engineering community. Recently, poster session events have been added where new attendees share their work, current or planned.

ChESS has had strong ties to *Chemical Engineering Education* (CEE) dating to the very first issue of CEE, which featured the promotion of the 5th ChESS in 1962.^[4] CEE included final reports from the 9th^[5] and 10th ChESS.^[6] More recently, special editions of CEE have encouraged new ChESS participants to expand their poster presentations into scholarly papers, including nine papers from the 13th ChESS^[7] and eight papers from the 16th ChESS.^[8] This special issue from the 17th ChESS builds on this history to include papers expanded from new attendees' ChESS posters and also provide an overview of some of the workshops. The resulting response to the call has been enthusiastic, leading to the need to distribute articles over three issues (Fall 2023, Winter 2024, and Spring 2024). We interpret this strong response both

as a reflection of the vibrancy of the Summer School and of the central role of CEE as an archival resource for the chemical engineering community.



Milo Koretsky is the McDonnell Family Bridge Professor in the Department of Chemical and Biological Engineering and in the Department of Education at Tufts University. He received his BS and MS degrees from UC San Diego and his PhD from UC Berkeley, all in chemical engineering. He studies learning and engagement in the classroom targeted at the development of conceptual understanding and disciplinary practices.

Daniel Burkey is the Castleman Term Professor in Engineering Innovation and the Associate Dean for Undergraduate Education in the School of Engineering at the University of Connecticut. He received his BS from Lehigh University and his MS and PhD from the Massachusetts Institute of Technology, all in chemical engineering. He also holds an MAEd in Educational Research Methods, Measurement, and Evaluation from the University of Connecticut. His research focuses on game-based educational methods, process safety education, and ethical reasoning development in engineering students.



Allison Godwin is an associate professor in the Robert Frederick Smith School of Chemical and Biomolecular Engineering at Cornell University. She received her BS in chemical engineering and PhD in engineering and science education from Clemson University. Her research focuses on how engineering identity and other affective factors influence engineering students' pathways into and through engineering.

© Copyright CHE Division of ASEE 2023

PAPERS

This issue contains three articles that were developed from new participants' ChESS poster presentations. In the paper, "Features of and Student Responses to Microsoft Teams® as a Learning Management System," Damilola Daramola (new participant) and Matthew Liberatore describe the adoption of Microsoft Teams as an alternative learning management system to Blackboard®. This paper stems from the co-authors' interactions at the Summer School poster session where they discovered – based on the first author's poster – that they were using Microsoft Teams in similar ways. As such, this work reifies an important social value in the chemical engineering education community (and of Summer School, in particular) of how a more central member (the second author) can support the developing practice of a more peripheral participant.^[9] In the paper, "Case-based Learning in Material and Energy Balances to Help Students Practice the Transferability of Chemical Engineering Problem-Solving," Christopher Chen and Scott Banta describe implementation of case-based learning pedagogy in their Material and Energy Balances course to replace some lecture and traditional homework. This paper addresses a shift in pedagogical practice that is salient for chemical engineering instructors generally and provides specific examples for the Material and Energy Balances course. The study is well-situated in the chemical engineering education literature and case-based learning more broadly and illustrates how instructional activities can place students in the role of sense-making and critical reasoning. In the paper "A Remote, Hands-on, and Low-Cost Sourdough Lab for First-Year Chemical Engineering Students," Virginia Jiang, Matthew Lucia, Scott Banta, and Christopher Chen describe a remotely delivered curriculum that explores the fundamentals of yeast fermentation using an inquiry-based "kitchen chemistry" approach and a guided inquiry pedagogy. The activities described in this manuscript were developed during the COVID lockdowns and are particularly laudable, given their low cost, safety, and intellectual appeal. This study also provides an exemplar of how curricula developed to accommodate the remote needs of the pandemic can be leveraged to improve later learning opportunities.

The issue also has one Teaching Tip about a technology tool for participant engagement and five

articles summarizing volunteer workshops from the Summer School. In the Teaching Tip, Dan Anastasio describes the use of various game-based apps and services to create engagement opportunities for classes, clubs, or even departments, based on the successful use of the EventZee™ app during the 2022 Summer School. Our other submissions showcase the wide range of workshops the chemical engineering education community brought to the 2022 Summer School. In "Strategies to Integrate Wellness into the Engineering Classroom," Sarah Wilson and Karin Jensen expand on their work in supporting student mental health. A previous paper by part of this team,^[10] featured in the Spring 2023 CEE issue, focused on connecting students to mental health and support resources, while this workshop paper provides readers with classroom strategies that promote the development of a positive course culture around student mental health as well as educational strategies to support students who may be struggling. With many new faculty attending the Summer School coupled with the growing number of engineering faculty engaging in educational research, the paper "Publishing Your Research on Education" from Milo Koretsky, Allison Godwin, and Don Visco is an excellent primer on how education research may be different from research that readers may have conducted previously and walks potential education researchers through important steps to consider as they embark on education research and the publication thereof. Christy West and Joe Holles do a deep dive on undergraduate research in "Undergraduate Research in Chemical Engineering: Benefits and Best Practices." The paper provides the reader different ways of structuring undergraduate research experiences as well as the mentoring opportunities those experiences provide. For new faculty getting started in building their research group, this paper provides a robust guide on how undergraduate needs may differ from graduate students in the lab and how to best incorporate undergraduates into your research strategy to mutual benefit.

Chemical engineering colleagues with extensive leadership experience – Lisa Bullard, Jason Keith, David Silverstein, and Don Visco – and a change expert, Charles Henderson, contribute an article that will resonate with any academic who has tried to make changes at their institution. Whether at the class, department, or school or college level,

readers will find valuable information and literature on proposing, implementing, and navigating change in “Becoming an Agent of Change: Theory and Strategy for Effective Change Planning and Implementation for New and Early Career Faculty.” Finally, Sandra Pettit and Cliff Henderson provide readers with an excellent overview of fostering good teamwork skills in students and how to help them in assembling high-functioning teams in their paper “Building Effective Teams and Teamwork Skills.” With many team-based courses in the chemical engineering curriculum, as well as the need to demonstrate positive student outcomes in team functioning for accreditation, this paper is a valuable resource for new or established faculty who want to improve the teaming skills of the students they teach.

FINAL THOUGHTS

As noted in the introduction, this is the first of three forthcoming issues of CEE that will showcase content from the 2022 Summer School. As this issue goes to press, the process for selecting the site for the 2027 Summer School is already underway. As that unfolds, these special issues serve to reinforce the special and important place that CEE has in the chemical engineering education community alongside the Summer School as some of our unique venues for supporting both faculty research and teaching practice.

REFERENCES

1. Hanesian D, Buonopane RA, and Perna AJ (2012) History of the ChE summer schools. *Chem. Eng. Ed.* 46(3): 196-203.
2. Wankat PC (2009) The history of chemical engineering and pedagogy: The paradox of tradition and innovation. *Chem. Eng. Ed.* 43(3): 216-224.
3. Cutlip M, Fogler HS, and Slater CS (2003) The ASEE Chemical Engineering Summer School for New Faculty. *Proceedings of the ASEE Annual Conference.*
4. Cooper AJ (1962) A.S.E.E. Summer School for Chemical Engineering Teachers. *Chem. Eng. Ed.* 1(1): 34.
5. CEE Staff (1984) Division Activities: Final Report: 1982 ASEE Summer School for ChE Faculty. *Chem. Eng. Ed.* 18(2): 53-55.
6. Schrader GL and Larson MA (1987) 1987 Summer School. *Chem. Eng. Ed.* 21(4): 168-169.
7. Barabino GA (2003) Introduction: Strategies for effective teaching in chemical engineering. *Chem. Eng. Ed.* 37(3): 168-169.
8. Bullard L, Silverstein D, Keith J, and Miletic M (2019). Introduction to special section on 2017 Chemical Engineering Faculty Summer School: The future is today. *Chem. Eng. Ed.* 53(3): 139.
9. Lave J and Wenger E (1991) *Situated Learning – Legitimate Peripheral Learning.* Cambridge University Press, Cambridge, England.
10. Wilson SA and Goldberg DS (2023) Strategies for supporting engineering student mental health, *Chem. Eng. Ed.* 57(2): 64-69. □