Experiential Learning of Manufacturing Standards: from Lectures to Labs and Industrial Internships

Yue Zhang, Haijun Gong, Lianjun Wu

Department of Manufacturing Engineering

Georgia Southern University

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Team Background

- Yue Zhang, assistant professor at Georgia Southern University.
- Expertise: nanomanufacturing, additive manufacturing (AM), and materials processing.
- Research Interest: AM of soft polymer materials for robotic applications, energy materials, advanced manufacturing education.
- Liaison between the Department of Manufacturing Engineering and Fabricators & Manufacturers Association (FMA).

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Team Background

- Dr. Haijun Gong is an assistant professor at Georgia Southern University. His research interest concentrates on additive manufacturing metals and polymers and their mechanical properties. He is interested in applying the 3D printing for advanced manufacturing. His research also involves lightweight structure design and high-performance material applications. Dr. Gong is a member of **ASME** Additive Manufacturing for Nonmetallic Materials Working Group. He is a member of editorial boards for the "Innovations in Materials Processing" Section, *Technologies* journal. He was a recipient of Randy Stevens Scholarship for university professor of additive manufacturing education and professional development (Additive Manufacturing Users Group 2017).

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Team Background

- Dr. Lianjun Wu is an assistant professor at Georgia Southern University. His research interest concentrates on robotics, smart materials and actuators and soft multi-material manufacturing using 3D printing. Dr. Wu is a member of Emerging Professional Group and Student Relation Committee at **SME** (Society of Manufacturing Engineers). He is a member of editorial boards of the journal Advances in Mechanical Engineering. He is also a member of Topical Advisory Panel for the journal Actuators.

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Main Goals

- Create a systematic framework that includes lectures, labs, and industrial internships to strengthen education and learning about robotics and additive manufacturing standards among engineering students.

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Project Objectives

1. Develop innovative course modules (lecture, lab, and project) to advance students' professional preparedness
2. Develop virtual learning materials to improve students' career readiness
3. Create a sustainable online course structure to enhance education and learning impacts.

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Teaching Materials

- Course Modules
- New Courses
- Guest Speakers
- Plant Tours

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Course Modules and New Course

	Additive Manufacturing	Robotics	New Course
Entry Level (Lecture)	MFGE 2421 Intro. to AM (15~20)	MFGE 3421 Controls and Networking Studio (16)	
Medium Level (Lab)	MFGE 5333 AM Studio (~10)	MFGE 4533 Industrial Robotics and Automation (16)	
Graduate Level (Project)	MFGE 5334G AM of Lightweight Structure (~10)	MFGE 7221: Flexible Manufacturing Strategies (16)	MFGE 5339G Manufacturing Standards and Standardization (10)

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Guest Speakers and Plant Tours

	Guest speaker	Plant Tour
Activities	• Webinars	• Trip to plant or virtual tour • Interview industrial professionals
Frequency	Spring and Fall Semester	
Sponsors	• Department Professional Advisory Committee (PAC) • Industrial professionals • Alumni	
Documentation	• Videos	

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PAC members

Gulfstream

MAHLE®

BRIGGS & STRATTON®

Great Dane

Nordson

JTEKT

Koyo

TOYODA

MITSUBISHI POWER

DANIEL DEFENSE®

Short-Term Impacts

- Improving students' understanding of the benefits of standards and enhancing their skills of utilizing and developing standards.
  - The experiential learning modules offer hands-on experience.
  - Encourage student to participate in industrial internship to practice the engineering standards.

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Long-Term Impacts

- Prepare college student for workplace with standardization concepts.
- Attract industrial partners to be involved in developing standards.
  - Strengthen the communications between GaSou and manufacturing community and promote a further collaboration in the standard development.

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Replication

- E-conference
- Class demos and seminar
- Project Website

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Replication

	E-conference	Class Demos and Seminars
Who	• GaSou faculties • IHEs: Jacksonville State University, University of Texas Permian Basin, etc.	
What	• Learning modules • Experience of using the modules	• Learning modules
When	Summer 2022 and 2023	Fall 2022 and 2023
Where	Face-to-face and online simultaneously	Online for other IHEs

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Website

- Video records of e-conference and seminars
- Course materials: module replication guide, class notes
- Project news and updates

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Dissemination and Sharing

- Project Website
- Conferences
- Professional Society
- Social Media

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Conferences

- SoTL Commons Conference 2022 (abstract accepted) & 2023
- ASEE Annual Conference and Exposition 2023
- NIST workshop 2022 and 2023

Professional Society and Social Media

- Professional Society
  - Forums (SME & FMA)
  - Mailing List (ETD-L)
- Youtube channel and Facebook account of this project
- Department Website and College Emails.

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Plans

- A 10-page project report will be prepared in Fall 2023
- Hiring of photographer
- Plant tour to Koyo Bearing

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Thank You!

Questions?

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