Connecticut

Manufacturing Instructor Evaluation Results

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Borrow My Glasses, LLC is an education company dedicated to aging & caregiving from a new perspective co-founded by gerontologist Donna Fedus & producer Lauren Lewis. Borrow My Glasses develops learning strategies, designs & delivers educational programs, and produces multimedia workshops & events. Borrow My Glasses also offers evaluation strategy & implementation. Learn more at borrowmyglasses.com.

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Executive Summary

"When the Governor visited, we didn't tell him we need a bigger building. Employers said I'm not bidding on any more jobs. I can put the machines in, but I don't have the people to run the machines."

Background

Connecticut's advanced manufacturing industry is booming again, leading to an urgent need to expand capacity and build the manufacturing workforce.

The manufacturing workforce in Connecticut mirrors the industry's history. Historically strong, Connecticut's manufacturing sector then lost more than 40,000 jobs between 2002 and 2012 (Commission on Connecticut's Future, 2014)[1]. In May 2013, Public Act 13-19 was signed into law concerning the restoration and growth of Connecticut's manufacturing sector, and the trend began to turn around. Much has changed over the past five years. According to a 2017 Connecticut Business & Industry Association survey, more than 13,600 manufacturing workers — machinists, welders, tool and die makers and others — are now needed in Connecticut[2].

This strong comeback fuels the need to attract new manufacturing workers and create a pipeline of students and trainees at all levels.

Our Evaluation Process

Four years ago, the Connecticut State College & Universities system received a grant to strengthen the state's advanced manufacturing industry[3]. As part of that effort, a broad Stakeholder Coalition of employers, associations and educators joined together to explore ways to increase the number of manufacturing instructors in classrooms and labs.

Borrow My Glasses, LLC, was hired to evaluate the viability of tapping industry retirees and other experienced employees to serve as instructors, preparing the next generation entering the advanced manufacturing field and benefitting the industry as a whole.

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[1] Commission on Connecticut's Future, 2014, www.ct.gov (retrieved 9-17-18)

[2] Connecticut Business & Industry Association, 2017, www.cbia.com (retrieved 9-17-18)

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Summary of Survey Findings

- Interest in teaching exists, but instructor training, supports and guidance are needed
- The main reasons respondents want to teach is to give back, build the future-manufacturing workforce, and prepare students for lucrative careers
- When considering messaging, half stay informed about advanced manufacturing developments and events from an association newsletter, websites, or their employer and one-third rely on social media for information
- Respondents seek information from their associations
- In thinking about their transition from full-time work, respondents would like their employers to share a variety of opportunities with them including flex-time and part-time work options, teaching, mentoring, and volunteering
- Timing is everything; of those interested in becoming an instructor, about one quarter (27%) would like to learn more when they are nearing retirement, 19% would like to learn more in mid-career, and 18% would like to learn more early in their career

Recommendations

- Hold a forum to discuss survey findings
- Develop joint messaging and communication campaigns about becoming an instructor or mentor, including public service announcements
- Ask employers and associations to share and promote newsletter items such as announcements recruiting instructors, advertisements for instructor training courses, and articles profiling instructors and/or students
- Consider how to engage other stakeholders, such as technical high schools, retiree groups or clubs, and the formerly incarcerated
- Develop instructor training programs and/or support forums as a benefit of association membership, perhaps facilitated by current instructors or community college trainers
- Create a shared database or registry for potential instructors
- Consider working with local community colleges to discuss how to build supports for interested employees to learn about becoming an instructor. Perhaps with the approval from employers, these instructors could give a brief presentation to employees or create a video that can be shared with employers
- Implement additional evaluation projects to measure impact or explore these issues further

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Introduction

Connecticut's advanced manufacturing industry is booming again, leading to an urgent need to expand capacity and build the manufacturing workforce. The industry currently has an uneven workforce pattern with a large number of experienced employees who tend to be older and approaching traditional retirement age within the next decade, few middle-aged workers, and now an increasing number of newer and younger workers.

The manufacturing workforce in Connecticut mirrors the industry's history. Although it was historically strong, Connecticut's manufacturing sector lost more than 40,000 jobs between 2002 and 2012 (Commission on Connecticut's Future, 2014[4]). In May of 2013, Public Act 13-19 was signed into law concerning the restoration and growth of Connecticut's manufacturing sector, and the trend began to turn around. Much has changed over the past five years. According to a 2017 Connecticut Business & Industry Association survey, more than 13,600 manufacturing workers — machinists, welders, tool and die makers and others — are now needed in Connecticut[5].

This strong comeback fuels the need to attract new manufacturing workers and create a pipeline of students and trainees at all levels.

Four years ago, the Connecticut State College & Universities system received a grant to strengthen the state's advanced manufacturing industry. As part of that effort, a broad Stakeholder Coalition of manufacturing employers, associations and educators joined together to explore ways to increase the number of manufacturing instructors in classrooms and labs.

Borrow My Glasses, LLC, was hired to evaluate the viability of tapping industry retirees and other experienced employees to serve as instructors, preparing the next generation entering the advanced manufacturing field and benefitting the industry as a whole.

> *"You're missing that middle section. You have a lot of young kids and a lot of people ready for retirement but you don't have a lot of 30-40 year olds here."*

> *"Business and industry are so anxious to get that employee to fill that void fast. We need to train people shorter, cheaper, faster."*

[4] Commission on Connecticut's Future, 2014, www.ct.gov (retrieved 9-17-18)
[5] Connecticut Business & Industry Association, 2017, www.cbia.com (retrieved 9-17-18)

Methods

Twenty key informant interviews were conducted to learn more about the state of advanced manufacturing in Connecticut. Respondents included a range of employers from small, mid-sized, and large manufacturing companies, retirees from industry who became instructors, current employees who may consider teaching, and community college administrators responsible for manufacturing programs.

Key informant interview questions were developed with input from the Stakeholder Coalition and covered the following 6 topics: viability of concept, incentives, barriers, supports, timing, and messaging.

Themes elicited through the key informant interviews were used to develop a survey, which was refined with input from the Stakeholder Coalition.

The survey was broadly distributed through employers, associations, colleges and universities, technical high schools, and retiree groups. Key informant questions can be found in Appendix A.

Results

About the Respondents

A total of 117 respondents completed a survey for analysis. Of those responding, most (79%) are male. Most (90%) do not belong to a union and work first shift (74%). Nearly half (43%) work at a small manufacturing company. About one quarter (23%) of respondents have worked in advanced manufacturing for at least 5 years and more than half (60%) have worked in the field for at least 15 years. Half (53%) are 55 years and older and plan to retire in 15 years or more (46%).

Gender	Male	79%
	Female	18%
	Prefer not to answer	3%
Age	18 to 24 years	4%
	25 to 34 years	15%
	35 to 44 years	16%
	45 to 54 years	12%
	55 to 64 years	37%
	65 and older	16%
In a union?	Yes	10%
	No	90%
What shift do you currently work?	First	74%
	Second	--
	Third	--
	Not applicable	26%
What size company do you currently work for?	Small (less than 50 employees)	43%
	Medium (50 to 499 employees)	33%
	Large (500 or more employees)	24%
How many years have you been working in advanced manufacturing?	Less than one year	7%
	One year to 4 years	10%
	Five to 14 years	23%
	15 years to 24 years	18%
	25 years to 39 years	27%
	40 years or more	15%
In how many years do you plan to retire?	1 to 2 years	6%
	3 to 4 years	10%
	5 to 9 years	15%
	10 to 14 years	12%
	15 years or more	46%
	I am already retired	11%

Top Areas of Manufacturing Expertise

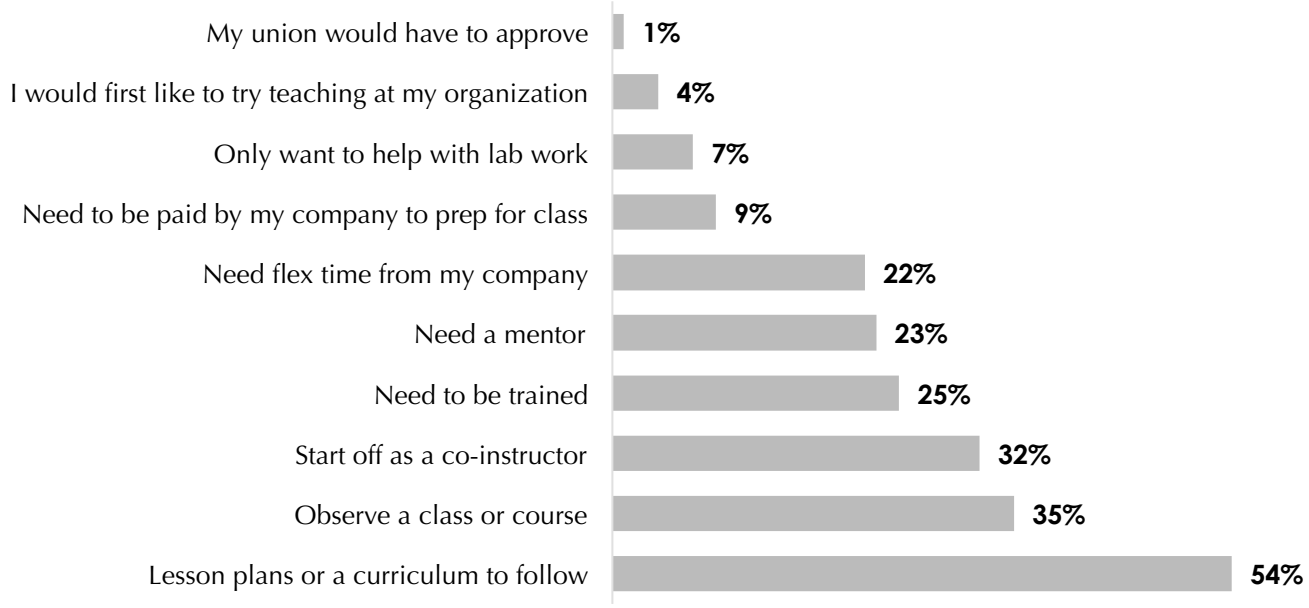
When asked about their top areas of expertise within manufacturing, respondents listed the following: manufacturing, lean manufacturing, CNC machining, quality control and assurance, tool and die, and Six Sigma. For a breakdown of responses, see Appendix B.

Teaching/Training Experience and Interest

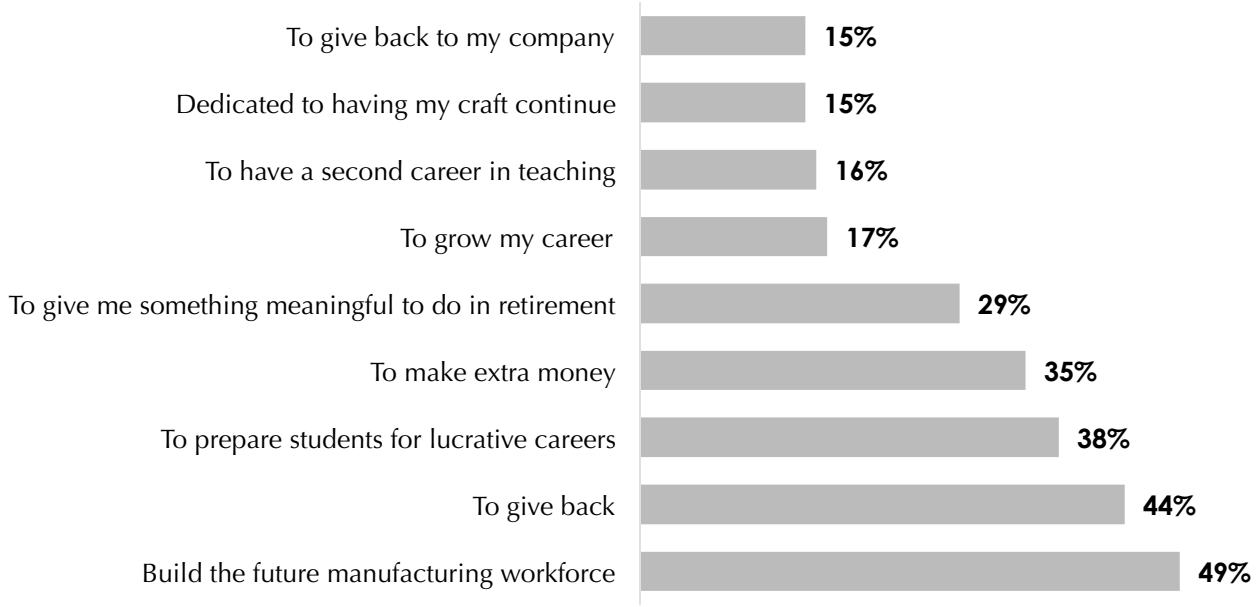
Half (54%) of respondents have formally or informally trained people in advanced manufacturing at their job and nearly half (41%) have not trained anyone. Some (12%) have taught at the college level or high school level (4%).

One-third (32%) of respondents have thought about becoming an advanced manufacturing instructor and 13% are already an instructor.

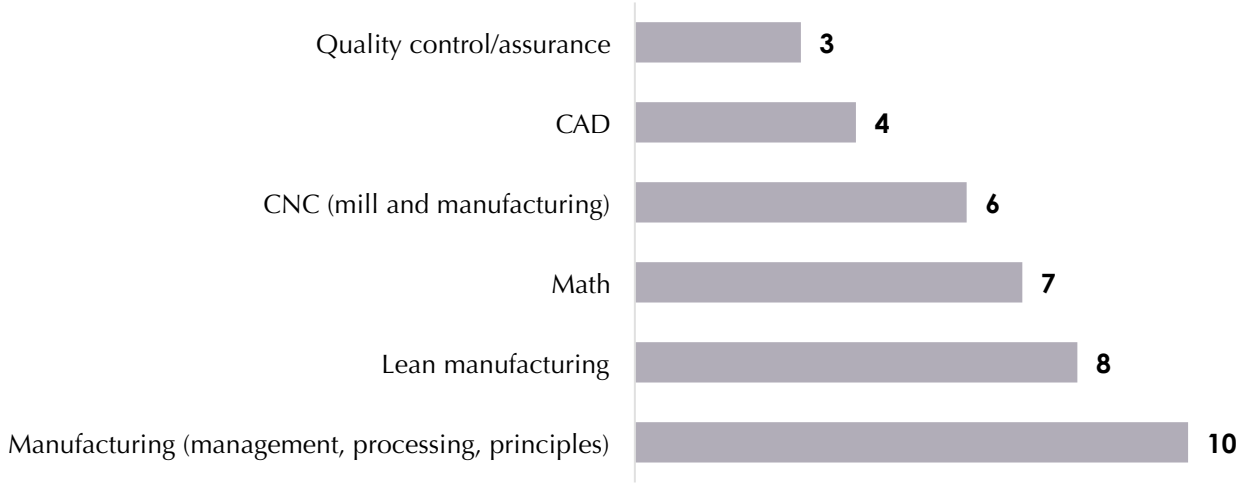
When asked what supports they would need to consider becoming an instructor half (54%) would like to have lesson plans to follow, one-third (35%) would like to observe a class or course or start out as a co-instructor (32%), one quarter (25%) would need to be trained on how to teach and have a mentor (23%).



Of the respondents that indicated an interest in teaching, **half (49%) would like to teach because they take pride in teaching the next generation and building the future workforce.** They also want to give back to the advanced manufacturing industry (44%).



The **top advanced manufacturing skills/subjects** respondents feel qualified to teach include manufacturing (management, processing, principles), lean manufacturing, math, CNC (mill and manufacturing), CAD, and quality control and assurance.

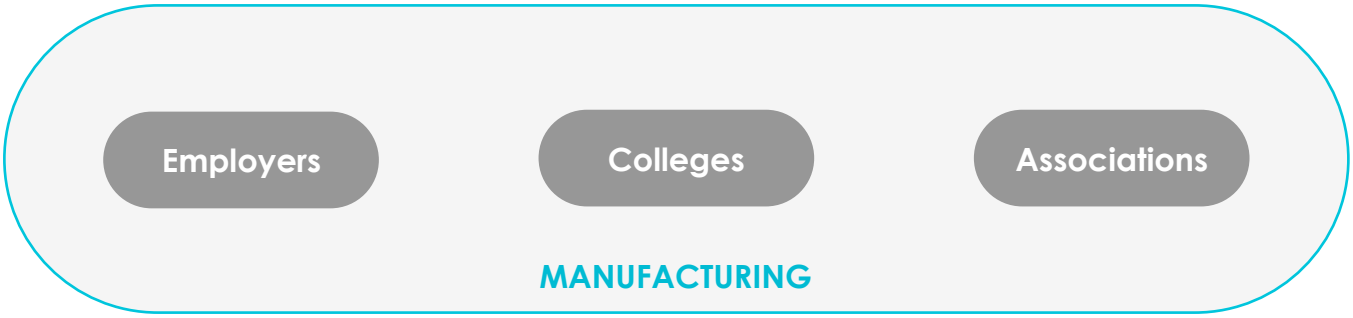


Half (55%) of respondents are not interested in becoming an advanced manufacturing instructor. Top reasons respondents are not interested include time restraints (49%), scheduling issues (46%), not enough pay (22%), no teaching experience (16%), and not enough on-the-job experience to be an effective teacher (15%).

Summary of Survey Findings

- There is an interest in teaching, but instructor training, supports and guidance are needed. Tools and supports requested to transition to a teaching role include having prepared lesson plans, working first as a co-instructor, and having a mentor
- The main reasons respondents want to teach is to give back, build the future manufacturing workforce, and prepare students for lucrative careers. Consider developing recruitment messages emphasizing these altruistic values
- When considering messaging, half (56%) stay informed about advanced manufacturing developments and events from an association newsletter, websites (56%), or their employer (49%) and one-third (36%) rely on social media for information
- Respondents seek information from their associations: New Haven Manufacturer's Association (26%), Aerospace Components Manufacturers (22%), Eastern Advanced Manufacturers Association (19%), and Smaller Manufacturers Association (19%)
- In thinking about their transition from full-time work, respondents indicate that they would like their employers to share a variety of opportunities with them including flex-time work options (47%), teaching opportunities (42%), mentoring opportunities (42%), part-time work opportunities (39%), and volunteer opportunities (30%)
- Timing is everything; of those interested in becoming an instructor, about one quarter (27%) would like to learn more when they are nearing retirement, 19% would like to learn more in mid-career, and 18% would like to learn more early in their career

Next Steps and Questions for Consideration



Each member organization of the Stakeholder Coalition will determine individual ways to make use of these findings, and next steps they can take collectively in collaboration with other stakeholders.

Following are just a few areas for consideration and suggested solutions stemming from both the key informant interviews and survey results:

Employers enthusiastically agreed with the importance of addressing the instructor gap

Employers are considering ways to:

- Help employees become instructors while on the job
- Assist employees to transition to an instructor role as they leave full-time employment

> *"I don't think we've spent enough time as an organization reaching out to retired and semi-retired people."*
>
> *"We haven't tried to retain workers nearing retirement. That's why the topic is fascinating. I think I'm missing out on a potential resource. We're looking at how to tap into this."*

One-third of respondents have thought about becoming an instructor, presenting a major recruitment opportunity

Considerations for employers:

Do you have consistent messages and methods of communicating opportunities for potential instructors?

> *"That was one of my goals in retirement: to do some kind of instructing. It was something I had talked about for a long time."*

> *"I'd have to think I have something to offer. Probably if my 401K doesn't work out as well as I thought, and I need some more cash, that might encourage me to teach, or boredom, I might be looking for something to do. Not having experienced retirement just yet I don't know. I'd like to leave all the doors open."*

> *"I would teach If I can help someone."*

> *"It's our responsibility. We spent our whole life learning this, at great pains and expense. The best person to teach this is the person with practical experience. You learn more from that than anything."*

Individuals are interested in teaching, but may need help communicating their knowledge

> *"I know the content but I don't know how to relay it in structured format."*

> *"If you don't have a story to associate with what you're doing, you just barely know it. If you have a story to associate with every piece, you know what you're doing."*

> *"The train-the-trainer thing is really important. Just because someone's been a machinist their whole career doesn't' mean they will be a good teacher. That could really turn somebody off. Then you lose the teacher and the students."*

Increasing the type and frequency of training and support is important for new instructors

Key informants identified interest in multiple kinds of instructor training programs, available at different points in time and in different lengths, including intensives, shorter boot camps, and refresher sessions.

> *"We've tried to run an ISW – an Instructor workshop for teaching – it's 4 days. Everyone's so busy…we really need to create a 6-hour seminar…that doesn't exist right now."*

> *"It's not good to give all the info to new instructors at once in one week – it's too much. Maybe there's some online stuff we could access to help acclimate instructors."*

While most were enthusiastic about the concept of approaching retirees to become instructors, barriers were also identified

> *"The only drawback in hiring retirees could be: if they have stayed up with the latest technology if they're close to or in retirement."*

> *"The wages that we pay for instructors, especially instructors in this trade is not nearly enough to entice people to consider a move from private sector to the public sector."*

> *"It's hard to find full time faculty with all the constraints. They're worth a lot of money. Full time employees are not going to come here to teach."*

> *"Once you retire, communication can change. I use my work email for everything. I don't have a home email. If I gave you my cell phone – it's a company cell phone."*

Teaching and flex-time opportunities may be appealing to individuals in various life stages

> *"Getting retirees is good but not the only way."*

> *"I was working the night shift but went in during the day and worked teaching three hours twice a week. When management was looking for people, they knew me, so it might not just be for retirees."*

> *"Having summers off is very attractive."*

> *"Part time really works well. It's not bad for someone in their 30's or retired."*

Most agreed it's preferable to consider teaching and try it out well ahead of retirement

"I think the bug should be placed, or they should have some idea while they're working that when I do retire this might be a way to get out of the house a couple times a week to be an adjunct professor."

"They could take courses ahead of time that would help them get to that point later…maybe after or before they retire. I felt that I never considered myself a teaching person. Even if I know I still might be a poor teacher, I might be short on patience. But someone who recognizes their shortcomings might be able to take classes to make themselves better candidates for teaching. Why would you want to spring something on someone when you can plan ahead?"

"If somebody was thinking of it, maybe five years from now getting ready to retire, they say, I'd like to consider teaching. In the interim, the company could allow a person to go and teach a few classes and see what it would be like. If there was a big enough company, you could run a few classes in the company on specific things – to see if they enjoyed it and could do it. They could teach nights or maybe even benefit the company by doing a class for employees. It would give you an idea how it works."

Educational institutions, employers, associations and other stakeholders may wish to collaborate to promote these issues and build a pipeline of manufacturing instructors

Recommendations for consideration include:

- Hold a forum to discuss survey findings
- Develop joint messaging and communication campaigns about becoming an instructor or mentor, including public service announcements
- Ask employers and associations to share and promote newsletter items such as announcements recruiting instructors, advertisements for instructor training courses, and articles profiling instructors and/or students
- Consider how to engage other stakeholders, such as technical high schools, retiree groups or clubs, and the formerly incarcerated
- Develop instructor training programs and/or instructor support forums as a benefit of association membership, perhaps facilitated by current instructors or community college trainers
- Create a shared database or registry for potential instructors

- Consider working with local community colleges to discuss how to build supports for interested employees to learn about becoming an instructor. Perhaps with the approval from employers, these instructors could give a brief presentation to employees or create a video that can be shared with employers
- Implement additional evaluation projects to measure impact and explore these issues further

> *"No sense in being redundant in every company doing their own. That would take too many resources. If every company gets out of it what their people need and plays nice, this could work."*
>
> *"To avoid any company feeling surprised, plan up front and offer joint communications for the good of the industry as a whole."*
>
> *"If we ran this like a summer sports camp – it doesn't matter what school you came from – you get there and you'll get what you need – you'll be a better runner or a better player. No one is poaching, saying, 'I want you to play on my team.' You all go back to the company you came from."*

Appendix A: Key Informant Questions

For Employers

- Are there industry standards in terms of what makes a company small, mid-sized, or large?
- Would you consider your organization to be small, mid-sized or large?
- How many (or what proportion) of your experienced employees are expected to leave your workforce or retire in the next 10 years?
- What plans (if any) do you have to address this issue?
- How do you retain workers nearing retirement?
- How are experienced employees involved in training new employees, if at all?
- If experienced employees are not currently involved in training new employees, would you consider going in that direction?
- Under what circumstances would you allow them to be involved?
- Under what circumstances would you allow experienced employees flexibility and/or financial compensation if they train to become an instructor?
- Under what circumstances would you offer current retirees incentives if they train to become an instructor?
- Do you currently engage in pre-retirement counseling or planning with your employees? What does the current program entail?
- Are part-time arrangements typically discussed?
- Are teaching opportunities typically discussed?
- Do you have a sense of the timing or messaging that would resonate with some of the retirees becoming instructors?
- Is there anything else you think I should know, or that you want to share?
- Who else should I talk with?

For Potential Instructors

- How long have you been in your field?
- Describe your area of expertise
- Tell me about your most helpful or inspirational teachers/mentors.
- Have you ever thought of becoming an instructor either before or after you retire?
- What would inspire you to become an instructor?
- What might stand in the way of you becoming an instructor?
- Would you consider becoming an instructor while you are working? After you retire?
- What are some things your company might do or have done to help you to become an instructor?
- What are some important qualities instructors should have?
- Is becoming an instructor BEFORE retirement something you are definitely going to explore / might explore / definitely won't explore?
- What factors contribute to your answer?
- Is becoming an instructor AFTER retirement something you are definitely going to explore / might explore / definitely won't explore?
- What factors contribute to your answer?

For Instructors

- Tell me a little about where you teach and the subjects you teach.
- How long have you been an instructor?
- Do you have work history related to advanced manufacturing?
- About how many hours per week do you spend preparing and teaching?
- How did you become involved in being an instructor?
- What inspired you to become an instructor?
- Did anyone in particular encourage you to become an instructor?
- Any experiences that were particularly influential in your decision?
- Did you teach or mentor others in your company?
- What were the challenges to becoming an instructor?
- Which parts of being an instructor are:
  - Most rewarding?
  - Least rewarding?
  - Most challenging?
- What types of support do you have at the school?
- Do you have a co-instructor or assistant at the school? Would it have helped?
- In what other areas would assistance or support have helped?
- Did you become an instructor while you were still an employee?
- If so, how you balance the two roles?
- What do you see as the advantages / disadvantages of becoming an instructor while you are still working vs. once you retire?
- Would you recommend teaching to other employees? Why or why not?
- What advice would you give someone thinking about becoming an instructor?
- What do you know now that you wish you knew before you started?

- In thinking about how manufacturing employers could encourage more experienced employees to become instructors:
  - Can you think of messaging that would resonate?
  - Is timing important?
  - Bring it up while still employed?
  - Bring it up in a pre-retirement meeting?
  - Make part-time positions available?
  - Have your company or someone else reach out to you in retirement?
- Would you be willing to add your name to a list of people who might want to be contacted for part-time work? For teaching opportunities?

For Community Colleges

- How have you been involved in the advanced manufacturing educational programs?
- What school?
- Are you involved in recruiting or training instructors?
- Are you also an instructor? What do you teach?
- Do you have work history related to advanced manufacturing?
- If we were to create a checklist with different types of advanced manufacturing areas – could you help provide a list or point me to a list?
- What have been the best recruitment sources for advanced manufacturing instructors?
- Have you tried / been successful in recruiting retired people to take teaching positions? People currently working industry?
- What do you see as the advantages / disadvantages of becoming an instructor while you are still working vs. once you retire?
- What messaging tends to resonate with potential instructors…or do you think would resonate?
- What do you see as barriers to recruitment – why might someone NOT want to take a teaching position?
- Why do you think someone experienced in advanced manufacturing WOULD want to take a teaching position at the college level (what would be most rewarding)?
- What do you see at the main challenges for new instructors?
- What supports does the school provide for new instructors?
- What other supports do you think might be helpful, if any
- Is there anything else you think I should know, or that you want to share?
- Who else should I talk with?

Appendix B: Respondent Topics of Expertise for Teaching

Topic	# Responding
Manufacturing (management, processing, principles)	12
Lean Manufacturing	8
CNC Mill and Machining	8
Math	7
Quality Control / Assurance	4
Employability skills/etiquette	4
Computer Skills/coding/programming	4
CAD/CAM	4
Swiss-lathe machining theory	3
Six Sigma	3
Electronics/Electrical	3
Blue Print Reading	3
3D Printing	3
Theory of Constraints	2
Precision Metal Forming (Coiling, Wire-forming & Stamping)	2
Organizational Design	2
Metrology	2
Mechanical Testing	2
Measurement	2
Inspection	2
Value Stream Mapping	1
Turning	1
Toolmaker	1
Tool & Die	1
Technical Writing	1
Teamwork	1
Supply chain – advanced manufacturing	1
Spring Design	1
Solidworks	1
Siemens NX-Basic-Large Assembly-PMI	1
Sheetmetal Layout	1
Running a machining center	1

Topic	# Responding
Report Writing	1
Quality Management Systems	1
Project Management	1
Process Improvement	1
Press Brake skills	1
Physics for Manufacturing (Materials)	1
Operating	1
Neuro Linguistic Programming Communications	1
NC Programming	1
Materials and Processes	1
Mastercam	1
Manual Mill	1
Manual Machining	1
Manual Lathe	1
Management or Line supervision	1
Machine Design	1
Logistics Management	1
Laser Machining & Operations	1
Instrumentation	1
Innovation	1
Injection Molding	1
Industrial Controls	1
Human Resources Strategy	1
Health and Safety	1
Grinding	1
General Machining	1
Engineering	1
Drawing Interpretation	1
Drafting	1
Design	1
Capacity Planning	1
Basic surface grinding	1
Alignment procedures	1
5S	1