

## **Work in Progress: Impact of the Entrepreneurial Mindset for Innovative Teaching (EMIT) Academy**

### **Dr. Sarah E. Zappe, Pennsylvania State University**

Dr. Sarah Zappe is Research Professor and Director of Assessment and Instructional Support in the Leonhard Center for the Enhancement of Engineering Education at Penn State. She holds a doctoral degree in educational psychology emphasizing applied measurement and testing. In her position, Sarah is responsible for developing instructional support programs for faculty, providing evaluation support for educational proposals and projects, and working with faculty to publish educational research. Her research interests primarily involve creativity, innovation, and entrepreneurship education.

### **Dr. Stephanie Cutler, Pennsylvania State University**

Dr. Stephanie Cutler has degrees in Mechanical Engineering, Industrial and Systems Engineering, and a PhD in Engineering Education from Virginia Tech. She is an Assistant Research Professor and the Assessment and Instructional Support Specialist in the Leonhard Center for the Enhancement of Engineering Education at Penn State as well as a co-founder of Zappe and Cutler Educational Consulting, LLC. Her primary research interest include faculty development, the peer review process, the doctoral experience, and the adoption of evidence-based teaching strategies.

### **Dr. Thomas A. Litzinger, Pennsylvania State University**

Thomas A. Litzinger is Director of the Leonhard Center for the Enhancement of Engineering Education and a Professor of Mechanical Engineering at Penn State. His work in engineering education involves curricular reform, teaching and learning innovations, assessment, and faculty development. Dr. Litzinger has more than 50 publications related to engineering education including lead authorship of an invited article in the 100th Anniversary issue of JEE and for an invited chapter on translation of research to practice for the first edition of the Cambridge Handbook of Engineering Education Research. He serves as an Associate Editor for Advances in Engineering Education and on the Advisory Board for the Journal of Engineering Education. He was selected as a Fellow of ASEE in 2008 and of ASME in 2012. He holds a B.S. in Nuclear Engineering from Penn State, an M.Eng. in Mechanical Engineering from RPI, and a Ph.D. in Mechanical and Aerospace Engineering from Princeton.

## **Work-In-Progress: Impact of the Entrepreneurial Mindset for Innovative Teaching (EMIT) Academy**

### **Abstract**

This work-in-progress paper describes the development and evaluation of an innovative faculty development initiative that incorporates entrepreneurial mindset (EM) and entrepreneurship practices into the educational change process. The Entrepreneurial Mindset for Innovative Teaching (EMIT) Academy is based on the tenet that the practices and mindset associated with quality teaching mirror practices of entrepreneurship and the entrepreneurial mindset. As part of the EMIT Academy, faculty engage in a series of workshops and activities intended to have them critically reflect upon a course that they teach. One of the key elements of the Academy is that faculty engage in “customer” discovery process in which they collect feedback from key stakeholders of their course, usually students. This paper describes the Academy, discusses preliminary assessment data, and provides information on future directions.

### **Introduction**

This work-in-progress paper describes the development and evaluation of an innovative faculty development initiative that incorporates entrepreneurial mindset (EM) and entrepreneurship practices into the educational change process. In 2020, as a result of grant from the Mentorship 360 Project funded by the Kern Entrepreneurial Engineering Network (KEEN) and Arizona State University, a teaching and learning center housed in the College of Engineering at a large research-focused university launched a new initiative called the Entrepreneurial Mindset for Innovative Teaching (EMIT) Academy. The EMIT Academy makes parallels between principles associated with entrepreneurship and quality teaching to help faculty innovate and assess the impact of their innovation.

Consider the processes and mindset associated with being an entrepreneur. A successful entrepreneur will develop a business plan and conduct customer discovery, then iterate and pivot in the face of failure. Entrepreneurs need to be curious and creative, to demonstrate the value of their product or service, and to make connections among multiple sources of information. Now consider the processes and mindset associated with teaching. Successful teachers will engage in a course planning process, periodically gather information from students on their learning and on their own teaching effectiveness and adjust teaching strategies as appropriate. A good teacher develops instructional activities that are engaging to students, creates a valuable learning experience for students, and integrates many sources of information to provide a seamless instructional environment. ***The practices and mindset associated with quality teaching mirror practices of entrepreneurship and the entrepreneurial mindset.***

The EMIT Academy uses the metaphor of *teaching as entrepreneurship* to frame a faculty development program for engineering faculty. The EMIT Academy was modeled on the National Science Foundation (NSF) funded Innovation Corps (iCorps) experience [1]. In iCorps, faculty work through a curriculum to help bring technology concepts to market. In the EMIT Academy,

faculty applied similar entrepreneurial principles and processes as iCorps to teaching innovation and evaluation. During the Academy, faculty do critical reflection, identify their “customers,” conduct customer discovery, then develop, implement and assess innovations in their courses. This paper will describe the EMIT Academy, the assessment strategy used to study the impact of the Academy, and preliminary assessment results.

## **Literature Review and Background**

Despite copious research on how to improve teaching (such as [2] and [3]), many faculty members still tend to teach in a traditional manner that does not incorporate many evidence-based instructional practices [4] - [6]. Considerable research has been conducted on the supports and barriers that may encourage or prohibit faculty from adopting evidence-based instructional practices, or those practices that are supported by research in education or psychology as being effective at improving student learning or other positive student benefits. As Borrego and Henderson [7] note, these variables include the characteristics of the innovation, potential consequences of adoption, benefits versus costs, personal characteristics of the instructor, familiarity with the innovation, and others. Other potential barriers to adoption of evidence-based instructional practices include lack of awareness, low resources, isolation, lack of collaborators, and lack of incentives [8]. Supports that encourage faculty to adopt evidence-based instructional practices include help from teaching and learning centers, abilities to collaborate with peers, financial incentives, and administrative support.

The EMIT Academy attempts to transcend some of these barriers by offering an opportunity for faculty to use focused time to critically reflect on their course, while being part of a learning community of peer faculty. Although assessment data is still being analyzed, we hypothesize that the Academy can be helpful to faculty for several reasons. First, the dedicated time likely helps faculty to focus on their course and be more open to adopting educational innovations. Secondly, because of an external funding opportunity and the teaching and learning center’s endowment, faculty were able to receive financial compensation to participate in the Academy, compensating them for their time dedicated to course innovation. In addition, the format of the Academy, with many interactive activities as well as reflection helping to engage faculty while allowing them to think deeply about their course. The focus on critical reflection has been found to be an important element in faculty development initiatives [9], [10]. Finally, we hypothesize that the entrepreneurship metaphor will appeal to faculty, as it is unique. No other faculty development initiatives using this metaphor were found in the literature.

While the focus on entrepreneurship may be unique in the faculty development literature, many student-focused initiatives have focused on incorporating entrepreneurial principles into engineering courses. These include the entrepreneurial-minded learning (EML) initiatives (e.g., [11] and [12]) that generated from work of KEEN [13]. This work stems from the idea that principles of entrepreneurship can be translated to other contexts, not just entrepreneurship courses.

Driving much of the work in entrepreneurship education, including Entrepreneurially Minded Learning (EML) initiatives, is the concept of entrepreneurial mindset. The term entrepreneurial

mindset has a somewhat contentious history, in that there is no agreed upon definition in the literature and the term suffers from construct confusion [14], [15]. The most commonly accepted definition of entrepreneurial mindset is that developed by KEEN, which defines it as the 3Cs: curiosity, connections, and creating value [13]. While this definition is pervasive in the literature, others have incorporated other definitions such as [16] who defined it as: a paradigm “intended to have engineers who bring an entrepreneurial attitude to the everyday practice of engineering, and in the process, create economic value to their employers and to society” [16, p. 1]. Others define it as “a set of beliefs, attitudes, or behaviours that drive innovation [17, p. 1]. For this paper and for the basis of the Academy, we follow the definition of Bekki and colleagues [18] who state that entrepreneurial mindset represents a set of “...cognitive behaviors that orient an engineer toward opportunity recognition and value creation in any context, not just that of an entrepreneurial venture” (p. 2). We extend this definition to include both cognitive behaviors as well as other attitudes and skills and focus on the fact that entrepreneurial mindset can extend beyond ventures to other contexts, including teaching.

As mentioned previously, the underlying concept of the Academy is that the practices and mindset associated with quality teaching mirror practices of entrepreneurship and the entrepreneurial mindset. Figure 1 displays several commonalities between teaching and entrepreneurship. This model is shared with individuals in the Academy and differences and similarities are further discussed. In the following section, we describe the Academy further.

Teaching	Commonalities	E-ship
Understanding your students	<b>Empathy</b>	Customer Discovery
Finding ways to engage students	<b>Inspiring Curiosity</b>	Problem finding/Opportunity recognition
Demonstrating value of course material	<b>Finding Value</b>	Demonstrating value of product
Connect to prior knowledge and real-world	<b>Making Connections</b>	Connections among different concepts
Adjusting, adopting, modifying	<b>Failure</b>	Pivot
Storytelling/Syllabus	<b>Communication Skills</b>	Elevator Pitch/Business Plan

Figure 1: Commonalities between teaching and entrepreneurship

### Description of the EMIT Academy

The EMIT Academy was hosted by a teaching and learning center in the College of Engineering at a large research-intensive university located in the mid-Atlantic states. The Academy aimed at

recruiting primarily associate or full professors (tenure or non-tenure track) who had not previously worked substantially with the teaching and learning center. Individuals were sent e-mail invitations asking them to send in a short application and a letter of support from their department head. As an incentive to participate in the program, faculty received one week of summer salary.

The inaugural EMIT Academy was held in the summer of 2020, with 9 participating faculty. These faculty included 2 women and 7 men, who came from various engineering departments including electrical engineering, civil engineering, engineering science and mechanics, chemical engineering, industrial engineering, and agricultural/biological engineering.

Although the original plan was to host the Academy in-person on campus, due to COVID-19, all meetings for the Academy were held remotely over zoom. An overview of the Academy schedule is presented in Table 1.

Table 1: Overview of the EMIT Academy

<b>Academy Element</b>	<b>Timing</b>	<b>Activities</b>
Assessment: Pre-Academy Interview	January	Interview about prior knowledge and expectations of Academy
Pre-work for Participants	May	Complete Entrepreneurial Teaching Model
Session #1 (2 hours)	June	Ice breaker: Two truths and a lie Discussion: Teaching and entrepreneurship similarities Discussion of Entrepreneurial Teaching Model Breakout groups: Ideas on how to revise course
Session #2 (2 hours)	June	Elevator pitches: Proposed course revisions Customer discovery assignment Reflection and discussion
Assessment: Survey	June	Survey to gather feedback on the first two sessions of the Academy
Homework	July	Customer discovery assignment
Session #3 (3 hours)	August	Discussion of customer discovery results and plan for changes to course
Session #4 (1 hour)	November	Discussion of how the course progressed in the fall semester
Post-Academy interview	February	Interview about perceived benefits of Academy and recommendations for improvement

Before launching the Academy, a set of objectives and goals were identified. After participating in the Academy, participants would:

- be able to identify how entrepreneurial ideas and principles can be used to enhance their course,
- critically reflect on a course by completing a teaching version of the business model canvas (the Entrepreneurial Teaching Model),

- identify areas of opportunity for change in their courses to better meet the needs of their students,
- collect and interpret data from a “customer” discover process of their students’ perceived needs for their course, and
- redesign their course using their Entrepreneurial Teaching Model and information from the customer discovery process.

Prior to the start of the Academy, faculty are asked to complete preparation work in the form of the Entrepreneurial Teaching Model. This model, which is designed after the Business Model Canvas is presented in Appendix A. The Business Model Canvas consists of nine key considerations: key partners, key activities, key resources, value propositions, customer relationships, channels, customer segments, cost structure and revenue streams [19]. The Canvas is used by businesses in planning activities, in order to balance potential value with costs when making business decisions.

Although the Entrepreneurial Teaching Model was designed after the Business Model Canvas, it was simplified to reflect only five of the building blocks that most apply to teaching. In the model, faculty are asked to critically reflect on their course by answering key questions relating to five areas:

- *Key stakeholders* – Who are the main stakeholders impacted by the course? Stakeholders can include students, industry, ABET, and other instructors. In addition to identifying stakeholders, participants are asked to consider who their students are and why they take the course.
- *Relationships* – How does the instructor build a relationship with the students in the course? How is a community built within the classroom that is welcoming for all students?
- *Value propositions* – Value propositions refer to how a product or service meets a need and distinguishes it from competitors. For a course, participants are asked to consider what the value the course, including content and instructional approaches, has for students and other stakeholders.
- *Key Activities* – What are the instructional strategies, student activities, and assessment strategies that are included in the course and how do these align with the value propositions?
- *Measures of Success* – Rather than dealing with revenue, as a business might, we consider the measure of success in a course and ask faculty to signify what “success” would mean in a course. What evidence is collected to demonstrate “success” and what evidence is collected for course improvement?

During the first two sessions of the Academy, faculty discussed the results of the Entrepreneurial Teaching Model, developed a plan to revise their course with consultation from the workshop facilitators, then prepared and delivered an elevator pitch describing their ideas. Following these sessions, faculty were given a homework assignment of doing a “customer discovery” activity where they collected feedback from their stakeholders. The participants varied in how they conducted their “customer discovery.” Some had conducted interviews with former students or

alums. Some had used a survey of former students or collected pre-course data from current students enrolled in the course. Several months later, in Session 3, faculty returned to the Academy to discuss the results of the customer discovery and new ideas for course revision. The final session occurred after a full semester to discuss how the newly revised version of the course went.

### **Assessment of the EMIT Academy**

Several guiding research questions were used to investigate impact and evaluate the Academy:

- 1) How do faculty conceptions of entrepreneurship and its application to teaching change as a result of participating in the Academy?
- 2) What are the perceived affordances and barriers to the adoption/adaption of innovative instructional practices and do these change as a result of participation?
- 3) How do faculty members' instructional practices change as a result of participation?
- 4) How can the EMIT Academy be improved for future cohorts?

To answer these questions, all participants from the 2020 cohort completed in a pre-workshop interview and an immediate post-workshop survey. In addition, the faculty participated in a post-workshop interview the following Spring (2021) semester. Interviews have been transcribed and will be coded using an iterative, deductive coding process. The pre-interviews for the 2021 cohort (second EMIT cohort) are being conducted in February of 2021.

Additional data to be analyzed as part of the assessment of the Academy include the responses to the Entrepreneurial Teaching Model and PPT slides provided which explain the results of the customer discovery process and the proposed course revisions.

### **Preliminary Results**

Most of the data for the assessment is in the process of being analyzed, as the post-interviews were just completed in February of 2021. Because the interview data is not yet analyzed, we present here the results of the post-survey administered immediately following the first two sessions of the Academy, which was completed by 7 of the 9 participants.

On that survey, participants were asked to state what they felt was the most helpful aspect of the Academy. Responses related to the ability to reflect on their courses, the benefit of using the Entrepreneurial Teaching Model, and the opportunity to connect with other faculty. Example responses on what was most helpful follow:

- The entrepreneurial teaching model, where we learnt how to revise our courses to incorporate those principles.
- Participation in the academy has "forced" me to pause and reflect on my class, and the EMIT framework is adding a perspective that I would not have otherwise used that I am expecting to promote practices that are different than I would have come up with just on my own reflection.
- The opportunity to have time to think and chat about making changes to a course.
- The conceptual framework made me rethink my class design considering value proposition and various stakeholders.

- Connecting with peers to brainstorm ideas. Seeing the versatility of this model.

Participants were also asked to rate the effectiveness of various aspects of the Academy in terms of creating community, revising their course, or overall workshop impact. The highest rated activity included creating the elevator pitches, hearing elevator pitches of other participants, opportunities for discussion, and using the Entrepreneurial Teaching Model. The least rated aspects of the Academy included the ice breaker activity and the use of Zoom as a method of delivery.

Participants were asked to rate their level of agreement, from Strongly Disagree to Strongly Agree (coded from 1 to 5, with 5 representing Strongly Agree) on a series of statements asking them about different aspects of the Academy. Figure 2 displays the averages for these items. The Academy was perceived very positively by the participants. Two of the five items had an average of 5, meaning all respondents had responded with “Strongly Agree.” These items were, “I would recommend the EMIT Academy to other faculty in my department,” and “I was able to critically reflect on my course.” The other items all had very high averages, with the lowest average being 4.71.

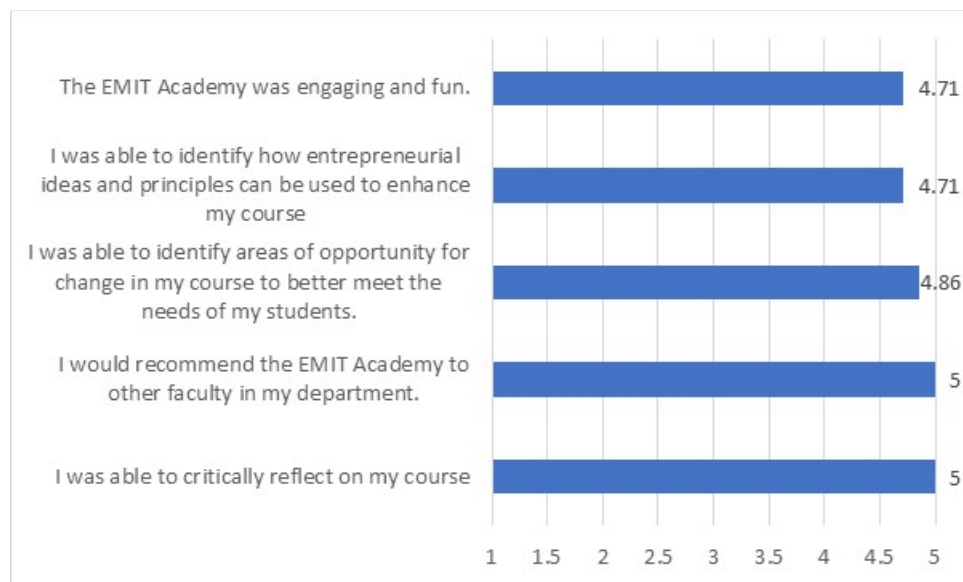


Figure 2: Averages for rating scale items.

Participants were asked to provide recommendations on how the Academy can be improved for future participants. Several had mentioned that they wished the Academy could be held in-person but understood that the current circumstances relating to the COVID-19 pandemic did not allow for this. They also suggested that more time be allocated for discussion with peers as well as the facilitators.

The findings from the immediate post-survey were all very positive. However, one limitation of the assessment is that the results may be indicative of a self-selection bias.



## Next Steps and Future Work

The 2021 Academy is currently being planned and will start in June of 2021. A total of 8 faculty will participate, including 5 women and 3 men, representing 6 departments in the College of Engineering. These departments include aerospace engineering, architectural engineering, chemical engineering, civil engineering, mechanical engineering, and engineering design. Pre-interviews with these participants are being conducted in February of 2021. Data analysis for the 2020 cohort interviews will be occurring in the Spring 2021 semester. Based on results of the interview coding, the authors plan to submit a manuscript for publication in a journal. In addition, the authors have been considering how the entrepreneurial model can apply to other aspects of faculty life, such as research and service. This perspective of holistic faculty development is advocated by some researchers, such as [20]. Interview questions were included to ask whether the model could be helpful if applied beyond teaching. A possible future direction is to examine the impact of the instructors' instructional changes on the students, in terms of increased learning gains or other potential changes in students' perceptions of the course.

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## Appendix: EMIT Academy Preparation Work

During the EMIT Academy, we will be discussing the ways that teaching and entrepreneurship are similar. In order to prepare for the Academy, you are asked to complete the Entrepreneurial Teaching Model, which follows on page 3 of this document. This Model is a modified version of the Business Model Canvas, a simplified model that describes how a business is run. We are going to focus on mapping five main categories from the Business Model to our Teaching to identify opportunities for course revision. These categories are described below:

- **Key Stakeholders:** When we teach a course, we have several stakeholders we must consider when designing a course. First and foremost (and obviously) are the *students*. The students have enrolled in your course for a reason, whether that may be to meet degree requirements or out of pure interest (or some combination!). However, there are other stakeholders who we should consider when designing the content and activities of the course. These might include ABET, industries who will hire our graduates, and other instructors for whom our course is a prerequisite. During the Academy, we will primarily focus on the student stakeholders, but when designing or revising a course, we can't ignore the other stakeholders who are impacted by the course or program. When considering the key stakeholders, consider questions such as:
  - Who are the main stakeholders that are impacted by my course? How are they impacted?
  - Who are my students? What are their demographics? Why do they take my course?
- **Relationships:** In business settings, we would consider how to build a relationship with the customer. In teaching, we will consider the relationships between the instructor and the students as well as the instructors and their peers. You may also consider relationships with the other stakeholders, if it applies for your course. For relationships, consider the following questions:
  - How do you build a relationship with and among the students to create the learning environment that aligns with the value propositions?
  - How do you build a community within your classroom that is welcoming for all students?
- **Value Propositions:** In business, value propositions demonstrate how a product or service meets a need and distinguishes it from competitors. When designing a course, we are thinking about the value that our course will have for our stakeholders in terms of both content and instructional approach. In addition, value propositions may also encapsulate the goals and objectives we have for the course. For example, the value that we have for a design course might be that the students will learn critical processes, software tools, and professional skills that will be necessary for a job in industry whose primary responsibility is design. This broad goal might represent just one of the values we have for the course. Other values might relate to acquisition of technical knowledge or practicing certain professional skills (communication, ethics, etc.). When considering the value propositions, consider questions such as:
  - What value do you believe that your course has for students and other stakeholders?

- If you asked your students (or other stakeholders), what value do you think they would attribute to your course?
  - What approaches or activities do you provide that are valuable to students? In what ways are these valuable for their pathway towards a future career?
  - Do your instructional approaches provide more value than what they can get from competing resources (such as reading a book or online materials)?
- **Key Activities:** The key activities are your instructional approaches that you use in the course. These include 1) instructional strategies to teach (i.e., lecture, active learning), activities students do (i.e., group work, projects), and assessment strategies (tests, homework, etc.). When considering your key activities, consider the following:
    - When considering your value propositions, what are the key activities that need to be included in your course so that students have the opportunity to gain and demonstrate the skills/knowledge you value?
    - What are the key activities that you do as an instructor to align with the value propositions? What are the key activities that the students do that align with the value propositions?
- **Measures of Success:** Businesses are primarily concerned with the bottom line, or how much revenue they are generating. In the classroom, we aren't concerned with revenue. The most likely measure of success in the classroom would be evidence of student learning. However, there could be other measures of success to consider, when considering the stakeholders. These might be increases in students' professional skills or success in future semesters. It also could relate to you, as the instructor. Are you more engaged and satisfied with your teaching role? For this category, consider the following:
    - What would indicate "success" to you in your course? What does "success mean?"
    - What evidence can you collect to demonstrate "success" (i.e., summative assessment)?
    - What evidence can you collect to find areas to improve the course to better reach "success?"

**Directions for pre-work assignment:**

1. Consider the course you want to revise in the EMIT Academy (note this can change from what you originally proposed).
2. Think about how you **typically** teach this course (*We're well aware that the COVID-19 pandemic drastically shifted your instructional approaches for the Spring 2020 semester! When considering your course, it is your choice whether to focus on teaching the course in an in-person or remote context. We'll leave that up to you for now!*)
3. In the model on page 3, complete each box to the best of your ability.
4. In the **Opportunities** column, think about where there are gaps. What questions are you not able to answer? Where did you not like the answers you provided? Where did you see a lack of alignment between your value propositions and the activities or relationships?
5. Make this your own. If the grid format is not working for you, change it to be something you can more easily work with. PowerPoint or a simple word document is also fine. Don't feel constrained to one page. Write as much as you need.
6. Be prepared to share your work during our virtual meeting.

## Entrepreneurial Teaching Model

Designed for (Course): \_\_\_\_\_ Designed by (Instructor): \_\_\_\_\_

<b>Key Stakeholders:</b>  <i>Who are the stakeholders for your course? Why is your course important for them? What are the demographics of the students? Who are your students?</i>	
<b>Relationships:</b>  <i>What are the key relationships that need to be built/maintained in your course? How do you work towards this?</i>	
<b>Value Propositions:</b>  <i>What value does your course, including the instructional approach and course activities, provide to your stakeholders?</i>	
<b>Key Activities:</b>  <i>What are the key activities (student activities/instructional approaches, etc.) that align with the value propositions?</i>	
<b>Measures of Success:</b>  <i>What does "success mean?" What evidence can you collect?</i>	
<b>Opportunities:</b>  <i>Where are the gaps when considering your value propositions, the key stakeholders, the key activities, and the relationships?</i>	