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Paper ID #36942

Work In Progress – The Process of Developing a Multilayered Mentor Model at our Engineering Entrepreneurship Summer Institute

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Work in Progress – The process of developing a multilayered mentor model for our Engineering Entrepreneurship Summer Institute at Villanova University

Abstract. We recently developed a multilayered mentor model for our popular Engineering Entrepreneurship Summer Institute at Villanova University. Our multilayered mentor model layers the experience, social capital and empathy associated with peer mentoring together with the transfer of knowledge, skills, and ability associated with traditional mentors. Peer mentors, selected from recent graduates of our Engineering Entrepreneurship Summer Institute, were paired with successful entrepreneurs to guide student venture teams. The multilayered mentor model, developed to reflect current best mentor practices, included mentor matching, goal setting, coaching and guidance. Our exit survey informed us that the multilayered mentor structure led to an enhanced and empowered learning environment for student venture teams. Additionally, peer mentors indicated strong enthusiasm for the personal relationship with the senior mentor and an increased desire for engagement in entrepreneurship. In this paper we discuss formation of the multilayered mentor model, outcomes from implementation of the model within our Engineering Entrepreneurship Summer Institute and discuss plans for future development. An overview of pilot model activity, including mentoring structure and topics are provided.

Introduction. This is a work in progress paper focused on sharing a new multilayered mentor model (M³) developed for our Engineering Entrepreneurship Summer Institute (E2SI) held annually by the College of Engineering at Villanova University. It provides an overview of the M³, which evolved from our more traditional mentor model. M³ was developed in the Spring of 2021 through collaboration between the Engineering Entrepreneurship faculty (Faculty) in the College of Engineering and a new student-run organization, the E2SI Alumni Mentorship Network (Alumni Network).

Mentoring incorporates the transfer of knowledge, skills, and ability through shared experience. The mentorship relationship serves to develop and strengthen self-confidence and entrepreneurial self-efficacy in the mentee [1]. Entrepreneurial mentors impact a wide range of behavioral and economic outcomes in a new venture, including entrepreneurial attitude and self-esteem, knowledge, opportunity recognition, and start-up performance [2], and are considered essential to any university venture model. Studies of the impact of mentors on student entrepreneurial development at the university demonstrates that mentoring helps shape entrepreneurial outcomes such as entrepreneurial intentions and nascent behavior [3].

Independently from collegiate entrepreneurial endeavors, peer mentoring has more recently gained attention at universities as an effective learning strategy [4]. Studies of peer mentoring suggest that peer mentors offer empathy along with equity and expertise [5]. Importantly, peer mentoring has recently evolved as an important dimension in university student retention. A freshman peer mentoring model developed at the University of Arkansas College of Engineering

demonstrated the potential impact of peer support as evidenced by metrics of success such as GPA and retention rates, which were significantly higher in mentored students as compared to non-mentored students [6].

Villanova University's multilayered mentor model (M³). Current entrepreneurship mentor models at universities are limited primarily to the traditional concept of mentoring, with a more senior individual (the experienced alumni) providing developmental assistance to student venture teams in a single dyadic relationship. In contrast, our approach follows the developmental network perspective. The developmental network perspective of mentoring proposes that individuals receive mentoring assistance from many people at any one point in time, including senior colleagues, peers, family, and community members [7]. The developmental network perspective mentor model identifies two key dimensions in its typology: (1) the diversity of individuals' developmental networks and (2) the strength of the developmental relationships that make up these networks. The two major types of support within these dimensions include: (1) career support, such as exposure and visibility, sponsorship, and protection, and (2) psychosocial support, such as friendship, counseling, acceptance, and confirmation, and sharing beyond work [7].

Multifaceted university mentor programs have been successfully created at the university faculty level to improve faculty retention and happiness. One such instance of a multifaceted model was reported at Rice University [8]. In this triad mentoring model, the university committee matched one senior female faculty mentor with two junior female faculty members (or protégés). The goals of this model were to provide information to junior faculty during the non-tenure time to enhance the beginning of their academic career and create a sense of belonging to their individual schools and Rice University. The university considers the triad mentor model a success in changing the climate for women faculty in the sciences and engineering [8].

Villanova University's undergraduate Engineering Entrepreneurship minor was launched in 2010. Open to students in all majors beginning in their sophomore year, the minor consists of 16 credits, comprised of both an academic year minor and highly successful venture accelerator program - the Engineering Entrepreneurship Summer Institute (E2SI). Throughout the duration of the seven-week summer institute, students from various colleges at Villanova and other universities participate in a fast-paced venture launch experience while earning a minor from the College of Engineering.

Annually, 25-30 students from the College of Engineering, the School of Business as well as the College of Arts and Sciences participate in E2SI. The minor consists of the following courses: Entrepreneurial Technologies, Creativity and Innovation, Opportunity Assessment, Feasibility Analysis, Prototyping, and Venture Formation. Learning is experiential. As students move through course content, they learn elements of new business development while building their ventures. Students form cross-disciplinary teams in our Opportunity Assessment course and remain in these teams for the duration of the minor. Upon formation of venture teams, mentors

are assigned to the teams for the duration of the program. In the Summer of 2021, we piloted the M³.

The M³ was composed of peer mentors (current university students who are recent graduates of the Engineering Entrepreneurship Summer Institute) and senior mentors, experienced Villanova alumni who have significant achievement in launching entrepreneurial ventures. The multilayered approach directly addresses both dimensions of support defined in the development network perspective of mentoring, by offering the venture teams specific assistance and empathic support from university peers along with advice and vision from compassionate seasoned professionals.

The model is organized and administered by the Alumni Network with assistance by Faculty. The Alumni Network is a student-run organization of recent E2SI Alumni, primarily juniors and seniors at Villanova, who have established the mission: *To serve the Villanova Community by acting as a voice and a conduit for E2SI Alumni to enhance and elevate E2SI activity* (Appendix I). Recruitment of peer mentors was conducted by the board members of the Alumni Network, while recruitment of senior mentors was conducted by Engineering Entrepreneurship Faculty.

M³ Program Goals. The immediate goals for the program are to (1) provide E2SI students with guidance through their E2SI journey, (2) establish a process for the implementation of the M³, (3) develop formal milestones for measuring progress, and (4) document and evaluate mentoring activities.

Institutional goals of the initiative are broader. Similar to the triad mentor faculty model at Rice, the foremost objective of the M³ is to create a sense of belonging in the Villanova Engineering Entrepreneurship community. We anticipate that participation by junior peer mentors will further (1) junior mentor entrepreneurial growth through engagement with the senior mentors and (2) fuel our entrepreneurial ecosystem growth. We reason that the peer mentoring impact previously reported on university retention¹ will similarly increase peer engagement across cohorts and lead to discussion and interest in both building entrepreneurial networks and in catalyzing student startups. Program structure development included:

1) formation of the e2si alumni mentorship network

The Alumni Network grew organically in early Spring of 2021 from a conversation between Faculty and an E2SI alumna regarding the sense of discontinuity that alumni reported feeling upon completion of E2SI, as well as the inability to network with other students who completed E2SI in different summer cohort years. The E2SI alumna also expressed an interest in staying involved in the startup space beyond E2SI. The idea of a student organization with representation across campus, focused on developing a peer mentor network, began to emerge.

First efforts in development of the Alumni Network focused on creation of a charter by the Faculty and the alumna to clearly articulate the organization's purpose, mission, and initiatives (Appendix I). The Mission Statement listed on the Alumni Network Charter summarizes serves

as the foundation of all initiatives of the Alumni Network. The mission statement also serves as a tool to communicate the purpose of the Alumni Network in email communications to E2SI alumni who are prospective mentors. The Charter additionally includes a Vision statement, Objectives, First Year Goals, and Second Year Goals.

The Alumni Network is led by a four-member Executive Board (Board) from the three major colleges across Villanova that participate in E2SI – the College of Engineering, the Villanova School of Business, and the College of Liberal Arts and Sciences. A document outlining Executive Board positions was created in tandem with the creation of the Charter. The student who initially spoke with faculty in creating the Alumni Network assumed the role of Chief Executive Officer, which includes responsibilities such as organizing and structuring network meetings and events, communication with the Board and E2SI faculty, leading brainstorming sessions, and ensuring continuity of mentorship recruitment efforts each summer. The Chief Operating Officer manages the network's budget and meeting minutes. The Events Coordinator pitches and organizes educational, networking, and bonding events to promote unity amongst E2SI cohorts and between E2SI alumni and industry professionals. Finally, the Mentorship Chair oversees the launch of the mentorship model, assists in the pairing of peer and senior mentors to E2SI teams, organizes the peer mentor interview schedule, and composes weekly "Pointers" email communications to send to mentors to provide guidance to E2SI teams (Appendix III). Top E2SI alumni readily agreed to fill these positions. The CEO met bi-weekly with both Faculty and with the Alumni Board members through the spring to maintain a sense of sustained responsibility and continuity for all parties involved.

2) solicitation and selection of mentors

Senior mentors. Six senior business venture mentors were recruited for the seven-week E2SI program. Specific criteria were deemed appropriate for determining the qualifications of senior mentors: successful launch of a business venture, significant business development experience at major corporations, or venture capital expertise. The senior mentors represented a variety of industry expertise including oil, CPG, healthcare, and electronics and development expertise ranging from venture capital, mergers and acquisitions, to marketing, sales, and distribution. One of the primary sources for Senior Mentors is our Engineering Entrepreneurship Advisory Board, composed of 20+ experienced entrepreneurs, primarily Villanova Alumni. We have a collaborative relationship with our Board, and many engage with university students multiple times throughout the school year. Senior mentors were also identified from working with the Villanova School of Business.

Peer mentors. The Alumni Network CEO sent an email to all E2SI alumni to introduce the Alumni Network, to describe the peer mentor opportunity and responsibilities, and to encourage interested students to complete an attached survey. The survey outlined the commitment expectations: 1.5 hours per week over 6 weeks, attendance at the orientation and conclusion

sessions, responsibility to organize all weekly meetings, and weekly individual meetings with their senior mentor.

The Executive Board then compiled an interview schedule to get to know the interested students better and evaluate their candidacy. The interviews were conducted on Zoom and lasted about 20 minutes in length. Some of the interview questions asked included:

- How do you think your E2SI team could have benefited from having a peer mentor?
- Why do you want to continue your involvement in E2SI?
- What qualities do you think are most important in a mentor?
- Can you think of a time when you benefited from a mentorship relationship?
- How do you see mentorship playing an important role in entrepreneurship?

Selected candidates were emailed to congratulate them and to alert them of the upcoming orientation that they were required to attend before the start of the program.

3) peer mentor orientation

The Peer Mentor Orientation provided the peer mentors with pertinent information on the role and began with Executive Board introductions. Executive Board members then detailed the timeline and expectations of the peer mentor position and led a brief lesson on the curriculum that the student teams follow throughout the E2SI Program. Peer mentors were then given the opportunity to ask questions at the conclusion of orientation. The Alumni Network CEO then distributed a summary email after orientation with the PowerPoint slides attached for peer mentors to reference throughout the summer.

4) senior / peer mentor matching

Peer and senior mentors were matched shortly after orientation by pairing peer mentors' academic interests with the industry expertise of the senior mentors. The Faculty and Alumni Network worked together to finalize the senior/peer mentor matches. The CEO emailed the mentor pairs to inform them of their match, to suggest a pre-launch meeting in order to share their interests and mentorship methods with each other, and to fill out a Google Sheet of their weekly shared availabilities that their assigned team could reference in requesting meeting times each week.

5) venture team matching

Venture team matching was conducted after the formation of student venture teams in week two of the seven-week E2SI. Team venture concepts ranged from sustainability to 3D printing to artificial intelligence. The Faculty and Alumni Network worked together to match mentor teams with student venture concepts. Match priority was set based upon the senior mentor's industry experience.

6) the right information and support at the right time

We recognized early on that organizing a diverse group of busy individuals with varying degrees of responsibility and commitment would require concise and detailed communication. Significant time was spent, therefore, providing thorough and concise directions prior to and during the program. For example, a Program Guide was created to provide a detailed overview of program structure and expectations (Appendix II). The document was sent out to the mentors prior to engagement with the student venture teams.

Additionally, during each weekend of the program, a weekly "Pointers" email was distributed to all peer and senior mentors to provide advice on icebreakers to kick off meetings, as well as details on what specifically students learned in the previous week's classes (Appendix III). Past E2SI Alumni had reported feeling that their mentors were unable to provide course-specific advice on their ventures and that their teams spent much of their time with mentors explaining course content. The pairing of peer and senior mentors in E2SI 2021 as well as distributing the "Pointers" emails to both Peer and Senior mentors each week eliminated this issue and senior mentors reported feeling more equipped to guide their teams.

At the halfway point of E2SI courses, the Alumni Network CEO sought feedback by way of a survey. The results indicated that 89.9% of mentor pairs met with their assigned venture teams 2 or more times at the time of survey distribution, with 55.6% of respondents reporting that meetings typically last 30-45 minutes. 88.8% of respondents "Agreed" or "Strongly Agreed" that they had enough background information on the E2SI course curriculum to advise their team each week. In addition, 88.9% of respondents "Agreed" or "Strongly Agreed" that they knew who they could reach out to if they ever ran into problems with their team, and 100% of respondents agreed that the weekly "Pointers" emails were an appropriate number of emails to keep them adequately informed.

7) group social activities

The Alumni Network hosted a virtual escape room activity for students to work with their teams outside the classroom setting. Venture teams worked together in finding clues to decipher secret messages that ultimately solved a mystery. This event served to create a feeling of community with the E2SI cohort and allowed the teams to work together to achieve a tangible success. Young entrepreneurs can get lost in the startup process and become disheartened when quantifiable successes are not immediately produced by their efforts. Frequent team-building activities such as the virtual escape room helped to prove to students that their efforts and team dynamics are capable of culminating in tangible successes.

8) post e2si mentor debrief

A post E2SI M³ conclusion Zoom session was hosted at the end of the summer to collect feedback and unite as a mentorship community. Conversation in the session uniformly commended the Multilayered Mentor Model. Senior mentors reported that peer mentors were invaluable in helping teams with coursework-specific questions. Senior mentors typically

provided more targeted career-based advice according to their industry experiences. The peer/senior mentor pairs also reported that the mandatory meeting between them was critical in establishing common interests and logistics before the onset of their mentoring responsibilities with teams. Comments made by peer mentors also informed the Alumni Network that M³ was successful in engaging E2SI alumni in the entrepreneurial community and continuing their involvement with E2SI.

Engagement emerged as a primary area for improvement in multiple dimensions. One senior mentor reported that they made themselves as accessible as possible outside of team meeting times, but that students were shy to reach out for advice other than on their specific projects. Mentors also suggested that they be involved during Week 1 of E2SI in order to assist teams in selecting their ventures, rather than being paired with teams during Week 2 based on teams' predetermined ventures. Based on the touchpoint survey that was distributed halfway through the summer, mentors expressed interest in hearing regularly from Faculty regarding their team's progress, as well as having more opportunities to sit in on class presentations throughout the summer rather than only watching the final pitch on the last day of the Program. Finally, mentors expressed that they initially struggled to hear from more than the same one or two team members, which mentors attributed to the nature of Zoom meetings and the difficulty in building trust and comfort in such an environment.

Discussion. Venture mentoring is an essential element of successful entrepreneurial endeavors. Typical mentor models are dyadic, with a more senior individual providing developmental assistance. This Work in Progress Paper outlines our efforts in the past year to launch a Multilayered Mentor Model (M³) for the Villanova University Engineering Entrepreneurship Summer Institute. The M³ is unique in partnering experienced entrepreneurs with recent student alumni of our summer institute to provide advice to our student venture teams. The success of the M³ stemmed largely from the desire of the student community to grow Villanova's entrepreneurial ecosystem. This shared desire developed rapidly into a cohesive vision and once the three other executive board members were selected, a sense of accountability was established between everybody involved in the launch. The collaborative community within the Board and between the Board and Faculty allowed the vision to come to life in a few short months. Our post E2SI mentor debrief demonstrated strong enthusiasm by all for the shared partnership. One clearly established highlight of the program was the bond that developed between the peer and senior mentors.

Additional key elements of success were identified as: having sufficient funds immediately available to support development activities, the high level of autonomy of the Board in determining its path, and the successful paring of peer/senior mentors to create strong partnerships.

We will continue to advance the model in upcoming 2022 summer program. Two areas for improvement arose repeatedly throughout the program: increased engagement during the E2SI

program and supplementary resources. As we move towards a post pandemic world, we plan to build more informational and social activities into M³ including holding a preliminary workshop for peer and senior mentors, and hosting bonding activities periodically through the program that mix students outside of their venture teams. Resource development may include a Mentor Handbook to assist in knowledge transfer and a plan to provide cubical space for peer mentors to meet with their mentees. As we move into our second year, we will also introduce success metrics. One key metric of success will be post E2SI engagement of students in university entrepreneurial activities. Encouraging results were obtained from an E2SI alumni interest survey where 100% of respondents showed a strong desire to be a peer mentor for E2SI 2022.

Appendix I - Sample Charter

Mission: To serve the Villanova Community by acting as a voice and a conduit for E2SI Alumni to enhance and elevate E2SI activity.

Vision: the E2SI Advisory Board will act as an independent organization providing guidance and resources to the E2SI Model. Student alumni of the Model will serve in an advisory capacity to the E2SI Model, will serve as mentors to current E2Si students, and act as student advocates and entrepreneurial leaders in the community.

Objectives:

- To build the entrepreneurial community across E2SI cohorts
- To connect students of all years and disciplines in entrepreneurial pursuits
- To offer E2SI alumni mentorship and entrepreneurial leadership opportunities.
- To encourage students to continue their ventures following E2SI

First Year Goals:

- Member recruitment
- Involve the alumni in the network by allowing them to serve throughout the upcoming E2SI Program

Second Year Goals:

- Recruit future E2SI students to become part of the network, possibly have "representative" positions for each year's cohort to serve in more of an administrative role
- Maintain engagement of current network members and assign executive roles (VP, Secretary, Treasurer, Publicist, etc.)

Appendix II - Sample Mentor Model Guidelines

Engineering Entrepreneurship Summer Institute Peer/Senior Mentor Guidelines

The Engineering Entrepreneurship Summer Institute (E2SI) Mentor Model aims to provide our student venture teams with experienced guidance in launching their ventures. Mentor engagement with venture teams will take place for 5 weeks from June 7th through July 9th with training for the Peer mentors prior to the start of the Model.

What Is A Peer Mentor?

A Peer Mentor is a Villanova student who has completed E2SI and is interested in giving back to the E2SI community.

What Is A Senior Mentor?

A Senior Mentor is an experienced entrepreneur, often a Villanova Alumni, with extensive career skills and real-world experience to share with the E2SI community.

Mentor Model Structure

5 one-hour weekly Venture Team Mentor meetings as arranged by Senior and Peer mentors and Student Team

5 half-hour weekly meetings between the Peer and Senior Mentor

Final Pitch Event

Mentor Guide

Prior to Start – Mentor Onboarding

Peer mentors receive training.

Venture Teams and Mentors are matched.

Week 1

Student Venture Team sends Venture Update to Mentors prior to first meeting.

Introductions, including background, etc.

Agree on best method of communication, times and weekly meet-up schedule.

Half hour weekly meeting between the Peer and Senior Mentor.

Week 2

Student Venture Team sends Venture Update to Mentors prior to meeting.

Check-in with previous week's actionable outcomes/core goals.

Half hour weekly meeting between the Peer and Senior Mentor.

Week 3

Student Venture Team sends Venture Update to Mentors prior to meeting.

Check-in with previous week's actionable outcomes/core goals.

Half hour weekly meeting between the Peer and Senior Mentor.

Week 4

Student Venture Team sends Venture Update to Mentors prior to meeting.

Check-in with previous week's actionable outcomes/core goals.

Half hour weekly meeting between the Peer and Senior Mentor.

Week 5

Student Venture Team sends Venture Update to Mentors prior to meeting.

Check-in with previous week's actionable outcomes/core goals.

Half hour weekly meeting between the Peer and Senior Mentor.

Post Mentor Model follow-up

Wrap-up any final tasks, adjustments, and thoughts

Discuss time together, learnings, achievements, and way forward.

Appendix III - Sample "Pointers" Email

It is recommended that the first meeting with student mentees should touch on the following items, but you are not limited to these suggestions. Please feel free to add any agenda items, notes, questions, and ideas to this list. All team meetings should aim to last ~ 1 hr in length.

***We recommend you designate a spokesperson from your assigned team during the first meeting, in order to make communications with the team easier.

Introductions

Describe your roles as mentors to the team as a whole and individual team members

Ask them for a brief description of their interests, passions, ideas they might have, etc.

What is one thing is they have learned so far that they want to learn more about--something that has struck them as interesting and engaging.

Ask them how their teamwork is going: what step are they on in the workbook? What chapter(s) did they read in the course textbook? Any updates on their project idea?

Ask them if they have any questions for you (as alluded to above, this should be a part of every team meeting).

Snip of course schedule for Weeks 1-4:

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
May-23	May-24	May-25	May-26	May-27	May-28
			E2SI Welcome	E5 EGEN 2150	E5 EGEN 2150
			Lunch	Lunch	Lunch
			Industry 4.0 Cindy Chan	E5 EGEN 2150	E5 EGEN 2150
			Open	Open	Open
May-30	May-31	Jun-01	Jun-02	Jun-03	Jun-04
		E5 EGEN 2150	E0 C&I - EGEN 2100 Tony	E0 C&I - EGEN 2100 DT Workshop?	Step 1 - Market Research
	HOLIDAY	Lunch	Lunch	Lunch	Lunch
		E5 EGEN 2150	E0 C&I - EGEN 2100 DT Workshop	Feasibility Review Board -JC, Tony, ????	Step 1 - Market Research
		Open	Open	Open	Open
Jun-06	Jun-07	Jun-08	Jun-09	Jun-10	Jun-11
	Step 1 Interview	Step 1 - Interview Question Development	Step 1 Interview	Step 1 Interview	Step 3
	Lunch	Lunch	Lunch	Lunch	Lunch
	Step 1 Interview	Step 1 - Interview Question Review	Step 1 Interview	Step 2	Step 4
	Open	Open	Open	Open	Open
Jun-13	Jun-14	Jun-15	Jun-16	Jun-17	Jun-18
	Report Out	Step 5 & 6	Step 7 & 8	Step 9	Step 10
	Lunch	Lunch	Lunch	Lunch	Lunch
	HBS Simulation - Food Truck	ompany Name and Brand Assignmen	Video Assignment	Step 9	Step 11
	Open	Open	Open	Open	Open

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