Using Technology Assisted Supplemental Instruction and Peer Mentoring to Improve Grades of Underrepresented STEM Students

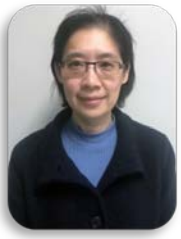
Host: Donna Milgram, Executive Director, Institute for Women in Trades, Technology & Science

Presenters: Dr. Angela Shih, Chair of Mechanical Engineering, California State Polytechnic University, Pomona and Lily Gossage, Director, Maximizing Engineering Potential (MEP) Center for Gender, Diversity & Student Excellence, California State Polytechnic University, Pomona

Interview Transcript:

Donna: Hello, and welcome to the second and final week of the *2018 STEM Success for Women Telesummit*. My name is Donna Milgram, Executive Director of the Institute For Women in Trades, Technology and Science. I'm so excited you could join me, 15 amazing speakers and almost 1200 educators for this free online conference funded by the National Science Foundation. Our speakers come from two-year and four-year colleges, big cities, small towns, rural populations, Hispanic serving institution and diverse communities.

Our guests today are both from Cal State Polytechnic University, Pomona, or Cal Poly Pomona. Dr. Angela Shih, who is the Chair of Mechanical Engineering, and Lily Gossage, who is the Director of the Maximizing Engineering Potential Center (MEP) for Gender Diversity and Student Excellence. They'll be sharing how Cal Poly Pomona is using innovative online supplemental instructions strategies to help underrepresented students pass high enrollment bottleneck STEM courses that traditionally have high failure rates.



Dr. Angela Shih

Dr. Shih has been an engineering professor at Cal Poly Pomona since 1995 and has spent her career experimenting with various technologies and related active learning pedagogies to improve student success, including flipping creation and utilization of videos in the classrooms, authoring online test banks and adaptation of project-based pedagogy and design classes. As a department chair, she led the department's efforts in offering Cal Poly Pomona's first massive online course in 2014 and '15, and the development of ME Online, a website that shares over 400 mechanical engineering video tutorials with the general public. The URL is www.cpp.edu/meonline.

Lily Gossage

Her efforts have been recognized with the 2017 Online Consortium Digital Learning Innovation Award and the 2015 Northrop Grumman Teaching Award for the College of Engineering at Cal Poly Pomona. Lily Gossage serves as the Director of the Maximizing Engineering Potential Center for Gender Diversity and Student Excellence at Cal Poly Pomona, and works to recruit and retain historically underrepresented minorities, including women, first generation, low income students in engineering. The overall goal of MEP is to reduce the achievement gap and increase the time to degree from minority students. With over 18 years of experience and engineering student success and as founder of the California State University, Long Beach's (CSULB) Women in Engineering Outreach Program, she's had extensive experience in developing K12 Outreach programs for inspiring young girls to become engineers.

She currently serves on the board of directors for the American Society for Engineering Education (ASEE), Women in Engineering Division, as well as for the Pacific Southwest section. She's developed and implemented academic enrichment programs including mandatory tutoring, and most recently, the newly piloted approach to supplemental instruction, which we'll be talking about today. Welcome. Welcome, Dr. Shih and Lily. Thank you so much for joining me for the *STEM Success for Women Telesummit.*

Lily Gossage (Lily): Thank you so much, Donna.

Dr. Angela Shih (Angela): We're happy to be here.

Donna: Okay. Let's go to our first question. Cal Poly Pomona or CPP is a Hispanic-Serving Institution (HSI) that plays a major role in producing workforce ready STEM graduates for California and the nation. According to the *2018 US News and World Report*, CPP's undergraduate engineering program is ranked fourth nationally among public universities, and one out of 14 engineers in California will be trained there.

Now you've shared with me that you recently adopted a vision as a university, to be the model for an inclusive polytechnic university that inspires creativity, innovation, embraces local and global challenges and transforms lives. **So, could you describe for me and our listeners, what is Cal Poly Pomona doing in regards to training women and underrepresented minorities to be engineers?**

Lily: Well, Donna, Cal Poly Pomona offers a comprehensive academic enrichment program. It's called Maximizing Engineering Potential, which is housed within the Center for Gender Diversity and Student Excellence. This particular program does support women in historically underrepresented minorities. It is fully inclusive, in that it also offers what we call an MEP Affiliates Program, which is open to all engineering students who might want access to some of our academic enrichment services, such as the stuff supplemental instruction that we're going to be discussing today, but they're not interested in participating fully in the cohort model.

MEP program is actually designed to help students that are first time freshmen and transfer students. We work to develop them into high achieving students so that they become more desirable graduates in whatever career they choose, whether it be professional engineering, engineering education, or field and research. We support the first-year freshman experience to help ease the transition from high school or from community college. We also offer programming that is offered to adult returning students. Currently, our cohort retention ranges anywhere from 95 to 100%. That's very hefty in terms of minority students. Given that we have what's called the Graduation Initiative 2025, this is a system wide plan for all 23 campuses within the California State University (CSU). It's meant to increase the graduation rates for both first time freshmen transfers.

There's currently a very strong push to rethink, revise and redo many of the approaches that we consider high impact practices to help students graduate. Not just to help them graduate, but to graduate quickly, time to degree. So, we are looking at four and six-year graduation rates. When we look at the institutional level in the college level data, here is what we find. And you'll find it interesting in terms of the overall graduation rate for women and minorities, when we look at the four-year graduation rate for the last eight years. First time freshman female students do outperform male students in engineering consistently by 5 to 11%.

However, when we look at graduation rates for transfer students also by gender, the graduation rate does differ from about 2 to 3%. The six-year graduation rate tells a very different story. In general, both first time freshmen transfer female students have a higher graduation rate than their male counterparts, even as high as 10%. When we analyze the overall trend, what we're seeing is that graduation rate rose from 60%, and this is in 2010, to as high as 70 to 80% in 2017. This data indicates that transfer female students have experienced some slight difficulties, maybe at the onsite as they're entering the university when they first transfer in. However, when we track the time to degree and some of the data on pass rates, the data indicates that for those women transfer students who persisted, eventually they did outpace their male counterparts. This is very exciting news for all of us. This means that 75% of those female students do graduate on a timely basis.

Donna: I want to just back up for a minute, because the first number that you threw out was that your cohort, that's the people in the MEP program, they're graduating at a rate of 95 to 100%. Did I understand that correctly?

Lily: Yes, that is correct.

Donna: Nationally, and again, there's a gender gap between males and females, but it's about but 50% the graduation rate. And so, your cohort, that is amazing. And so, I just want to commend you on that. And we're about to hear very soon about some of the strategies. I want to also make sure I'm understanding about transfer students and these are primarily from two-year colleges. Is that right?

Lily: Yes, we don't look at the four to four-year transfers. We primarily serve two-year colleges from the California community colleges.

Donna: Okay. So, that's a great interest. **A large percentage of our audience and our focuses with two-year colleges, and what I'm understanding is that although overall females actually outpaced the males in your cohort, that the exception is with female transfer students. Although, did I understand in the long-term they're actually doing well? Could you just sort of go over that again?**

Angela: Yes. Basically, the female freshmen outpace their male counterparts more when they enter. But we do not see the same degree of outpacing. They still perform better than their male counterparts, but the difference is much less than the freshman. But we do think that the gap start picking up. So, if the female transfer persisted, they ended up achieving the same or higher graduation rate their male counterparts on the same scale as their freshman.

Donna: Is there an issue for male transfer students as well?

Lily: We're not seeing the same rates of course completion among transfers and freshmen. With freshmen females, their SAT math is much higher than male transfers. I'm sorry, male freshmen. When you're looking at transfer students, the females that come in are lower in terms of academic preparation. But those who persisted graduate at a fairly higher rate than male transfers. This is a matter of retention as opposed to recruitment of qualified students coming in. So, what we're saying is it's opposite for freshmen female than it is for transfer females. This is where MEP is of significance to transfer students who are females.

Donna: Okay, great. **What percentage of the engineering students are female?**

Lily: Currently, 21% of the entire undergraduate engineering population are females, but in MEP, it's 55%.

Donna: Okay, great. **What about underrepresented minorities?**

Lily: I'm going to take a look at the fall '16 cohort. So, at the college level, 3% are African American, 0.2% are Native American, 28% are Asian, 43% are Hispanic and 0.2 %are Native American, and then 26% are white. When you look at the MEP cohort, the female representation is 55%. African American representation is 11%. American Indian Alaskan 3%. Asian is 20%. Hispanic is 53%. And Native Hawaiian, Pacific Islander is 4%. White is 9%.

Donna: Okay, so it's definitely a diverse community. Let's move to talk about your new approach to supplemental instruction. I just want to mention for our listeners that this is actually the second time that I've interviewed you. I also interviewed you, Lily, for the 2015 Telesummit that at that time was not with Dr. Shih. I'm very excited about your new approach to supplemental instruction. What I understand is that it's helping with passing high enrollment but high failure bottleneck engineering courses that are at the higher levels not introductory. I know that most of the work in this area has been in the introductory level, but your focus is on the upper level courses, where they are disproportionately screened out and not retained.

I understand this is very important. And then, of course, this is where the transfer students' success comes in. I remember seeing a report for the American Association of Community Colleges (AACC) that the majority of underrepresented students actually transfer from two-year colleges. And so, this is extremely important work that you're doing. I'd like you to describe your pioneering efforts with supplemental instruction in these upper level courses.

Angela: Sure. I just want to mention that the basic model that we're following and for most of the supplemental programs in the nation is the Kansas City model, which was established in the late 1970s. The universities using these models show that the students have gained at least one letter grade higher when they attend the supplemental instruction sections regularly. However, as you mentioned, most courses that these supplemental instruction services are introductory courses such as the general education courses. Or even if they're technical in nature, there could be a freshman orientation courses or introductory to program.

At Cal Poly Pomona, as the data indicated them, a lot of our students are not able to pass some part of that courses for engineering students. And the students are identified as statics, dynamics, introduction to fluid mechanics, thermodynamics, and so forth. These are just mechanical engineering courses that we find that are difficult for students to complete. In other majors, the bottleneck courses include upper division technical courses. The definition for us is that the bottleneck courses have to have a failure rate of 25% or more for the class. At the same time, many, many of these bottleneck courses do have an achievement gap between the underrepresented minority students from all of the students. Hence, Lily and I decided that we wanted to try and offer supplemental instructions for these courses to better help our students.

Lily: So, what's happening at Cal Poly Pomona is for the first time ever, we are offering supplemental instruction for all seven engineering departments. We have aerospace, chemical, civil, electrical engineering, electromechanical engineering technology, mechanical engineering and manufacturing

engineering. So, among those seven departments, there are 13 supplemental instruction courses with a total of 31 sections. There are 13 student facilitators and over 15 faculty advisors.

So, courses like Aerospace 329, which is structural analysis and design; for chemical engineering, stoichiometry; for civil engineering, structural analysis. For electrical engineering, we offer network analysis one and two. For electrical mechanical engineering technology, we offer Applied Statics in addition to the courses that Angela mentioned, as well. These are all seven departments, total of 31 sections that we're serving.

Angela: Yes. And I also want to mention that part of this as supplemental instruction, our supplemental instruction model are the videos that you have mentioned on ME Online. The mechanical engineering department, through the prior work, working with the CSU transfers office, we have developed more than 400 online videos on ME Online to help students passing these courses. This is the department hosted website. If you want to find something similar to it, it's sort of similar to Khan Academy, but our videos are focusing on upper division engineering courses rather than math and science.

These video consists of course lectures, short concept videos, demonstration videos, problem solving videos and so forth. It is free for the general public. The data have shown that when we did a survey where about 25% of the mechanical engineering students responded, which is about 350 out of about 1200 students, 86% feel that the videos are valuable to their education, and 75% responded that the videos do help them improve their grades in at least one class. There are students who indicated that I believe about 40% indicated that these videos help them in better grades in three classes or more.

Lily: I want to step back and give our viewers, Donna, you had mentioned many came from the community colleges, and I think they'll relate to what I have to share with them. Prior to the implementation of supplemental instruction, just the Kansas City Missouri model, MEP, like many of the Mesa Community College programs and other MEPs at four-year institutions offered what's called AEW. So, that was the older model. AEW stands for Academic Excellence Workshops. These AEWS are very similar to supplemental instruction, I'll go over the differences.

So, both AEWs and supplemental instruction (SI) use what we call student facilitators. These are student facilitators who have received a passing grade of A in these bottleneck high DUF, meaning the letter D, U for unauthorized withdrawal, and F as in F grade. These are very high achieving students and they're hired as facilitators to guide students in the work to collaboratively master course material. There is the guidance of a faculty course coordinator, so we have one for each of the supplemental instruction courses that have been identified as bottleneck high DUF. The student facilitators train to develop exercises that foster debate among small group learning. As a result of this interaction, students gain both a sense of connectedness as well and a development of their own learning style. So, many of the facilitators that we have, are themselves historically underrepresented minority and women students. Of the 13 facilitators we have this spring, five are women students.

In SI, though, this is where the difference is. The facilitators have what we refer to as seat time. They have to sit in a section of a class of the course that's been identified as bottleneck high DUF in order to pace along the lecture that's being provided. At the same time, the faculty coordinator will meet with the student facilitator at least once, one-hour a week, to review and verify material. So, we involve the faculty in a very great way in terms of viewing the material as well as verifying and challenging and supporting the student facilitator.

What is different about this model, and Angela is going to talk about the technology that is in this new model of supplemental instruction which we call technology-assisted or TASI, is we use iPads and we use videos that are created by the student facilitators. They will be captioned at the end of the semester. The students are actively challenged at each SI session so that at the end of the term, the videos that we create will be vetted by the faculty coordinator and will be captioned. So, Angela can tell you a little bit more about the difference between the supplemental instruction model and this technology assisted model.

Donna: That sounds great. I want to just make a follow up comment and ask a question before Dr. Shih describes more about the technology. **So, the faculty coordinators are actually the faculty that are teaching the course? Do I understand that correctly?**

Lily: They may or may not be. Because this is an expansion. It's a scale-up model. In this way, we've been able to support all sections of statics, all sections of stoichiometry.

Donna: Okay. **And the student facilitators are actually sitting in the actual courses that they're providing support in to the students in MEP, and the sessions that you described that are being recorded and captioned at the ends of the course, those are sessions between the students who are providing peer facilitation support. And, the students are actually in the class. Is that right?**

Lily: There are no full recording of the sessions. The sessions are offered twice a week on Tuesdays and Thursdays from 12:00 p.m. to 1:00 p.m. At Cal Poly Pomona, we have something called U-Hour, which is very unique. Twice a week, Tuesday, Thursday, 12:00 to 1:00 there are no classes being offered or scheduled. This is the time when we have our supplemental instruction. So, the facilitators work with the faculty coordinators to select five problem sets for which they will moderate videos, similar to what we have in Khan Academy. I think that's the best that I can describe it. At the end of the term is when we will vet the videos and caption them.

Donna: Okay. So, it's a bit of a more formal supplemental instruction with these problem sets that includes the student facilitators presenting and also capturing the students as part of it.

Lily: Its captioning is to ensure that the material's Americans with Disabilities Act (ADA) compliant and students who have visual or hearing disabilities will be able to access those videos as well.

Donna: Sure. Are the students who are in the supplemental instruction also recorded as part of this?

Lily: No, they're not in the videos. These are just the problem sets that have been identified throughout the term. I think this is a significant piece that's different from most supplemental instruction, is that the facilitators throughout the term work with students and identify the problem sets that are most challenging. We don't create videos for every single problem set, those that have been identified as being difficult to solve. We're creating a repository of Khan Academy type videos for every single one of the supplemental instruction courses.

Donna: You're zeroing in on the common areas that the students are having problems with. Great. So, thank you for that clarification. Dr. Shih, please go ahead and describe more about the technology component of the model and the advantages of using the technology.

Angela: Sure. As Lily mentioned, the supplemental instructions, the problem sets as they're demonstrating are being recorded. That is something that is not being done in the classic model. On top of it, our SI instructors are requested just through their training sessions to preview all of the videos on ME Online. What they're requested to do is when students ask relevant questions that indicate they have a difficulty understanding concepts or they have difficulty understanding part of the lectures, these students are now directed specifically, almost like a guided approach to sections on ME Online, if there are available videos to review those sections and then go back and do the homework problems.

The advantages of these efforts or these technology is that, like Lily mentioned, the videos are captioned and can be reused. At the same time, since we recorded it, we can edit them as well. Each institution now can use these videos and to build their own video libraries. As we know that building your own video libraries is time consuming and expensive, especially if you're using faculty's time. This time, I think it is good for the students to make the videos, because I think it's nice for the student to see that these videos are made by students themselves. We do not worry about the accuracy because these videos have been vetted by our faculty coordinators or our faculty experts.

Donna: So, this is really curated content. Supplemental instruction is one of the important elements in our WomenTech Retention Training in one of the plan elements. So often, it's important to distinguish what is good, you know, and vetted and curated content versus anything that could be online. And flipping a classroom, it can be extremely time consuming for an individual instructor. So, now everybody's got access to this curated content and including our listeners, for which I'm very grateful.

Angela: Yes. I think that's the curated vetted content is our intent. Everybody should be able to, if they follow the model, duplicate it then eventually we can all join forces and create this large video library that has been created and vetted by faculty experts. A side benefit is that the supplemental instructions are required to meet with their faculty coordinator for an hour a week. It's during this time the faculty then go through a close mentorship with these peer supplemental instructors.

What's nice about it is that a lot of them, since they volunteer, or they requested to be these peer mentors, I think they probably are interested in engineering education already. So, many of them can turn out to be teachers and then maybe will be back to society. We will end up having more engineering educators along the way. So, I think this is another way to kind of, in terms of community building, that you give back to the community. And then, we have more people who are intent in contributing to helping minorities and women in engineering education, and we're hoping that again, the peer institutions will follow up and then we can have a cohort and a community that will scale up and contribute.

Donna: So, this is a beautiful ancillary benefit. **What I just want to call out is that what you're describing is a feedback loop for the faculty from the peer mentors about those areas that they're seeing the students having the greatest difficulty with, so that that information can be incorporated in a feedback loop to adjust the course teachings, if I understand correctly. Is that a right characterization?**

Angela: You're actually reading my mind. Not only is the feedback for the students, but it's also for the faculty. The reason we pick the faculty coordinators is that the fact that the coordinator will then get back to the group of faculty that teach the similar courses. So, they will report back to our own faculty to share what they have find. Our faculty then can use this feedback to adjust how they teach in their

lectures and so forth. And then, you're right, if they want to flip their courses and want to turn the lectures into more active learning kind of environment, now we are increasing the number of videos in the library for them to use.

Donna: I am curious, and I want to say one of the colleges, and I've talked about them a lot in my webinars and my training, City College of San Francisco, they did supplemental instruction on binary numbers. Two of the instructors actually were doing a Master's in Online Curriculum Design. They developed two videos on binary numbers, they put them on YouTube, and they not only helped all their students, but many thousands of students have thanked them. It's such a powerful strategy. You are going beyond that, which is getting the instructors and professors to adjust the way that they teach. That's something that we've also accomplished in school teams we've worked with in our WomenTech Educators Online Training, it's not easy to do**. To get a culture and which the faculty are willing to make changes. I wonder if you could just talk to that a bit.**

Lily: So, Donna, this is not similar to the supplemental instruction classical model that most CSUs use or even the community colleges use. We don't out a specific section of a course. In many cases where I see supplemental instruction being offered, there is a particular section of course. When you do that, then you're basically identifying that professor or that instructor. What we're doing here is we support supplemental instruction for all sections of a particular course. Even if the section is doing well, but it's comprehensive, it's everyone. In a sense, this is a very wonderful model where everyone benefits. Even those instructors who tend to be stronger. So, it's a vulnerable place when you're asking or announcing or advertising okay, so and so section is the one that has been identified for supplemental instruction.

So, this is a teacher professional development model where there is a multiplier effect and no one instructor is being identified. We want to make sure that we have anonymity when we're talking about what we call low completion rate courses or low completion rates sections. We know which sections, we know which instructors have historically by trend analysis had a higher failure rate. Those are not published in anywhere and told to the student facilitators. So, we enjoy this model because it's got a lot more buy in. The faculty may not know directly that they are receiving professional development. But again, as I mentioned, we have a lot of minority and women students who we hire as student facilitators. They work on a weekly basis with the faculty coordinator who then disseminates that information to his or her colleagues. There is a multiplier effect in this.

Donna: I think that is a very important distinction that you have described here, Lily, which is that nobody's singled out. And so instead, it's about how the entire department can utilize these resources. It's been my experience that the instructors and professors that are already doing really well with a very high retention rate normally welcome additional tools such as the mechanical engineering video tutorials, or such as more information about patterns that the peer tutors and mentors may be seeing in terms of what the students are struggling with.

I know at the introductory level as part of our recruitment plan, we have them identify what are the building block skills that students often don't come with. Essentially, that often professors are like, "Wow, we can't believe they don't come with these skills." There's common set of those. Those are the ones to focus on for building blocks. So, I really love the way you have made that really the normal way of doing business at Cal Poly Pomona, and no doubt it contributes to your 95 to 100% retention rates for those students who are in your MEP program. And that, therefore, you're able to get all of the

professors and instructors to be on board for utilizing these tools and for getting this kind of feedback. It's not for any particular faculty member.

The other piece is that you're developing these peer mentors as, again, part of the community and they themselves are diverse, which provides that positive cycle. So, I have to say, I'm just so excited about this. And, so many schools are struggling with this and also struggling with it at the higher-level courses. There is content at the introductory level, not as much as I would like, but very little at these higher-level courses that really can result in students not making it through. **Now, I know that this particular model that we're describing is very new. You've just done one quarter, but have you had any early outcomes that you could share with our listeners?**

Lily: We had piloted starting Fall '17, just to examine the feasibility of using the iPads. In Fall 2017, we purchased iPad Pros, swipe cards, so every single student who is receiving support has to swipe in and swipe out, so we know that they were there. They're individually tracked. In Winter of 2018, we implemented the model. And, spring 2018, which is now, we are expanding the model. So, we do have a very small sample size so, I don't think we can predicate any conclusions from them. But we do know that the of the small sample size we had in winter, everyone passed the class.

What we're doing in spring now is making it mandatory for specific selects number of students who have taken the class before. So again, this is not something that we publicize to the student facilitators or the faculty. We have a lot of data that we can take a look to see who are second time students enrolling in the class. So, it's such a small sample size. We will have full and more comprehensive data analysis that we will share for the spring 2018 cohort, for which there are 31 sections of SI that we're offering. That data will be available at the next American Society for Engineering Education Pacific Southwest Conference, which will be held next April in conjunction with ELC. I know that there are many community college listeners online. ELC is the Engineering Liaison Council. So, there will be many community colleges who will be attending the 2019 conference, which will be hosted by Cal State University of Los Angeles. At that time, we will be publicizing the results of this first attempt.

Donna: I want to let our listeners know Engineering Liaison Council and I have presented before them in the past as California Statewide Engineering Educators Group. I would like to attend and hear those results. As you know, in terms of final question, much of our work is with two-year colleges. And, as part of working with school teams to have results, we have them look at their baseline data-year to four-year. When we look at the data, we find that actually 80% of the students that are female and underrepresented minorities are actually being screened out via the coursework and including the upper level coursework. **And so, I wonder how you think these strategies might translate to a two-year environment. I know, Lily in particular, that you have some familiarity with two-year colleges.**

Angela: I'll start first. I think the supplemental instructor model is actually a proven model that helps students in the bottleneck courses. One of the reasons that they're not as widespread is they're fairly expensive to implement. Of course, our videos are all free and available online. So, maybe many of the community colleges can start using these videos in their courses with their instructions, and they eventually add in the supplemental instruction model technology assisted. And then once that get going, I also understand that it is costly to generate a video library. But this is a good way to kill multiple birds with one stone, where you have a supplemental instruction going helping students in bottleneck courses, at the same time, start to generate a video library of your own that will help other students, future students in other courses.

Again, perhaps, when we meet at the ASEE Pacific Southwest Session, all those interested, we can sit down and talk about maybe starting a consortium where we put all of our videos together, in terms of categorically and searchable, similar to Khan Academy. But these will be targeting for engineering bottleneck courses specifically for tough engineering courses or tough science and math courses that are difficult for engineering students.

Lily: Donna, I want to add, and I so appreciate you asking the question about community colleges. Community college transfer students, their participation rates on campus are starkly different from freshmen. So, we have to attempt to find a way to reach them when they're not on campus. So, this technology assisted supplemental instruction model, where Angela and I are working with many faculty across the seven departments to produce these videos, will promote access for students who are not on campus. This generally includes veterans. We have a huge veterans population here. They all come from the community colleges and they are unable to attend many times on campus in person.

The use of technology to provide academic enrichment anytime anywhere is very significant to us as a way to engage our transfer students. So, I did appreciate that question you had. We can't provide enrichment to transfer students in the same way that we do with freshmen. This is new territory for engineering educators.

Donna: And again, just to emphasize to our listeners, the consortium model. Because I know many individual instructors who have flipped their own classrooms, but there's not a consortium model. It would be wonderful to have a consortium model within a college but even beyond within a college, across two-year colleges. And, in some cases, some of them material's going to be the same. And so, I know that there's going to be some two-year colleges they'll be able to take advantage of your online videos. But in addition, using online elements means that there's less need, there's not as many peer mentors that are required.

I'm very excited and will continue to follow how this is going, and hope to have you back for a future Telesummit. We have a lot of good questions from our audience. One of our listeners asks, ***"Could you describe in more detail about who are the peer mentors and how does that work?"***

Lily: Donna, this particular technology assisted supplemental instruction program being offered here at Pomona is unique, in that it is not being facilitated by the department or at the department level. It is being facilitated by MEP. So, we have access to a cadre of women and minority students. Not all of the student facilitators are from MEP. They are referrals from MEP students. They're also referrals from the faculty coordinators themselves. So, our recruitment model involves the peer mentoring program that we already have in the College of Engineering. We draw from third year and fourth year students who are both in MEP or MEP affiliates program. There is a matchmaking tool that we use to see what the fit of the student is. So, it isn't enough for the student to just pass the supplemental instruction class that's been identified with an A, the student has to be able to communicate and be willing to sit in the classes and also be open to a number of other training offerings we have in MEP.

Every month, we have what is called an MNM, mentor mentee workshop, where we have our mentors and our mentees, including the supplemental instruction student facilitators attend. This is another opportunity to build community. I think the unique aspect of the supplemental instruction program here at Pomona is it is being facilitated through a Minority and Women Engineering Program.

Donna: That is really key. It gives you access to the women and underrepresented students. But then what I'm also hearing, because there may not be enough within that program, is that they're also making referrals. My guess would be that they have a higher connection to other women and underrepresented minorities. So, it's that kind of peer to peer recommendation also helps you with recruitment of that group. Am I correct in guessing that?

Lily: Yes, you're right on target. The millennial generation is a peer centric generation. So, we tend to take the referrals from the students as opposed to the faculty, although we do consider referrals from the faculty.

Donna: Okay. Another question that we have from our listeners is, and I know we touched on this a little bit, but to expand, ***"Who reviews and approves the videos and the content that's being offered?"***

Angela: The faculty coordinators. So, the first pass is that the videos must be vetted by faculty coordinators. And then, what we're looking at is multiple faculty teach the courses. Like Lily said, this is not just for one faculty, one section. Just give you an example, for statics, each quarter we have 10 sections of statics with over 300 students involved or enroll in that course. So, when the peer supplement instructor first bring the video to the faculty coordinator, the faculty coordinator will have the first pass, and then say, "This is okay for production." We actually have an online video expert who has been the Instructor of Record doing the Massive Open Online Course (MOOC). He and I will sit down and look at the quality the video and then see if it's good enough to be captioned or to go on as it is, or does it need to be edited and so forth.

Very often, it is possible that out of the five videos or 10 videos submitted, we were going to say that maybe one or two of them are good enough to move on to be captioned, and the other ones have to be remade. So, they will be remade according to whatever script that they have done, so that it's of a better quality in audio and both in video. So, there is a multi-layer process to vet a video. First through the fact that the experts and then do the content experts and then we obviously have to make sure that it is ADA compliant.

Lily: Donna, what Angela's mentioning is the videos are being created by the student facilitators. So, unlike the ME Online, that's the foundation from which we're working, is these videos are being created and moderated by the students facilitators in collaboration with the faculty for vetting the material. So, not all videos will be selected, only the best ones. It's an iterative process. We hope to build videos for all seven engineering departments and for all high DUF bottleneck low completion rate courses. So, this is the repository that we're working toward.

Donna: Now I have a question myself that I thought I want to ask which is, I know that you mentioned you provide what really is professional development for the peer mentors who are students. **Is part of that professional development on developing videos?** Because although nowadays we all can pull out our cameras and do a video, it's totally different to do it for a teaching environment.

Angela: If their videos are selected, right now what they're doing is they're basically recording the live session on iPad. They're doing their problems iPad, talking to the iPad. So, everything is very spontaneous. If their videos are picked, we're going to pick at least one video from one peer mentors. Everybody will get at least one video pick, and then they will have a chance to meet our video guru

probably to redo the video again. That is where they get their customized one on one videotaping professional development session.

Donna: The video guru is someone employed as staff at college or is it faculty?

Angela: No, he's an engineering faculty. He's Dr. Paul Nissenson. He basically led the effort in terms of trying to figure out which technologies and how to record the video, which software for the videos, and through practices he flipped his own classes. He records his own videos. So, through many, many, many hours of practice he has become the leading expert in video production not just for the college, but also for the university now. So, I'm extremely lucky to have him in my department.

Donna: You are. And my guess is that there might be someone at the colleges of the listeners. Because often, there is that one person who is the first one to flip their classroom. Perhaps they can be a resource and perhaps they can get release time in order to be in this role to help others. I do know here in California, we are lucky enough also to have, from CCC Confer, some resources and help with online teaching and support. And sometimes there's people in individual community colleges as well. But my guess is that each college may also have someone who is their guru. I just wanted to ask you about that.

Donna: Okay. Those are some excellent questions from our listeners. I just want to thank you again so much, Dr. Shih and Lily, as well as all of our participants.

Angela: Thank you for having us.

Lily: Thank you, Donna.