Ohio Researchers for Engineering Education: A Community of Practice

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***Abstract* – An informal organization was created to bring together researchers from the State of Ohio to share best practices. This organization, Ohio Researchers for Engineering Education (OREE), has been collaborating for approximately 3 years. Through this Work-in-Progress paper, a background of the organization will be given as well as some reflections from its members about the strengths, weaknesses and opportunities for improvement of the group. The group's successes have included three collaborative conference research publications, curricular enhancements from shared ideas, and a shared sense of community. Most of the challenges and opportunities for improvement focus on scheduling and management of the group. It is the authors' hope that this paper and the reflections contained within it will provide guidance to anyone looking to create a similar community of practice within engineering education. Furthermore, the reflections contained within this paper will provide the group with a blueprint on how to proceed in the future.**

Index Terms – Collaboration, Community of Practice, Engineering Education.

INTRODUCTION

Ohio Researchers for Engineering Education (OREE) is an informal organization that brings together researchers from various universities across the state to share best practices related to engineering education. Through OREE, we hope to share what we are doing, get feedback on new initiatives, and support each other as engineering education researchers and teachers. Currently, there are representatives from five different Ohio universities involved. The universities represent a variety of higher education structures (public, private, urban, rural, etc.) and student bodies within the State of Ohio. One to three people at each university participate in OREE; however, we interested in growing the membership.

The organization meets virtually approximately once a month via conference call to discuss topics related to practice and research. Additionally, OREE plans in-person meetings at conferences and other engineering education functions to strengthen our network. Most recently, we met in person at the American Society for Engineering Education (ASEE) National Conference and Exposition in New Orleans, LA.

One of the common threads that runs through the organization is that all of the universities have a first-year engineering program or are in the process of developing one. This brings focus to the meetings and allows for a common ground on which to discuss different aspect of engineering education. It also provides a specific context for the development of new ideas, programs, and research.

Our largest collaborative project to date has been a research project related to major selection that resulted in multiple papers that have been presented at conferences [1]-[2] and insights that can inform practice. Additionally, three institutions collaborated on a paper about student perceptions of the inverted classroom [3]. In the future, we hope to continue and expand this work to learn more about first-year engineering students in our state.

This Work-in-Progress paper will detail the brief history of the organization and provide reflections from select current members of the group. We also provide recommendations for others who are interested in starting similar groups in their states or regions. Our hope is that in the future others will benefit from such an organization as we all continue to build and expand the field of engineering education.

BACKGROUND

The group began approximately three years ago with participants from four universities: The Ohio State University (OSU), Youngstown State University (YSU), Ohio Northern University (ONU) and the University of Cincinnati (UC). While the group formation was organic, it was informed by a community of practice [4] where the domain, the community, and the practice all play a crucial role in the functioning of the group. The domain, a shared area of interest and expertise, includes engineering education and first-year engineering. The community which requires collaboration, sharing knowledge, and assisting others is fostered through the discussions and the creation of new projects. The practice relates to both research and teaching and is informed by the experiences and knowledge of each member of the group.

For the first meeting, participants visited The Ohio State University for an in-person discussion. This meeting laid the foundation for the group and established the initial connection between the members. After this initial meeting, monthly conference calls proceeded for the first year. During these monthly calls, a participant for the different universities would lead the call sharing research efforts at their university through PowerPoint slides. After the first year, these conference calls became more of an avenue to brainstorm

ideas of future collaborations and grants. In addition to the monthly calls (or semesterly calls when schedules are extremely difficult to navigate), the group continues to have in person meetings at conferences.

DISCUSSION AND RECOMMENDATIONS

All current and former participants of the group were provided a chance to reflect on OREE and provided the following insights. We hope that anyone trying to start a similar group in the future will be able to use this information to have a successful collaboration.

I. Most Useful Aspects of OREE

One of the most useful aspects of OREE was providing a network and support structure of engineering educators across institutions in the state.

> *"… We can share best practices, give feedback on innovative ideas, or simply commiserate about common issues we're facing. The national and regional conference provide that as well, but they only occur once a year and are often too large to have truly meaningful interactions. The fact that we can have conference calls once a month (or more if needed/desired) with a small group of devoted individuals makes our interactions much more meaningful and productive.*
>
> *The second benefit is that OREE provides a support structure for those who may be the only person engaged in engineering education research at their institution. While engineering education research has made progress towards being on equal footing with technical engineering research, many still view it as a lesser form of scholarship. The constant battle for recognition can be draining, and OREE provides an outlet and a source of support." – Greg Bucks, UC*

> *"When I started as a faculty member at OSU, I was looking for a research group to help me stay connected and up to date. OREE allowed me to connect with those in my field without having that specific group my own institution. As a new faculty members, this was invaluable." – Rachel Kajfez, OSU*

> *"While new engineering education programs are in development, the majority of universities still have just a few faculty that do research in that area based on their own interest and do not have other collaborators." – Kerry Meyers, YSU*

Another useful aspect has been the collaborative projects that have been conducted at these institutions.

> *"The biggest collaborative project completed was a study examining major selection in first-year engineering students. This study has resulted in numerous papers and future research efforts. Additionally, a multi-institution look at the inverted classroom approach was also conducted with this group resulting in an ASEE conference paper in 2015." –Krista Kecskemety, OSU*

II. Most Challenging Aspects of OREE

Most of the challenging aspects have to do with distance interactions and scheduling.

> *"I think the most challenging aspect of OREE is simply trying to coordinate schedules such that we can have regular meetings. I know we have enough trouble in my department trying to get everyone together for a 1 hour meeting, and we're all co-located with a familiar course schedule. Finding times when people from multiple institutions can get together for a call is even more challenging. " – Greg Bucks, UC*

> *"The most challenging aspect of OREE has been the scheduling of meetings. Every member has a busy teaching schedule and therefore it becomes difficult to schedule meetings that everyone can participate in. Also, the busy schedules sometimes impacted the collaborative projects we could participate in." – Krista Kecskemety, OSU*

> *"The most challenging aspect of OREE is that we are all spread out so almost every meeting is done as a conference call instead of in person, this works because we have a strong and organized leader. But it is always better / more enjoyable if more of the interaction is face to face." – Kerry Meyers, YSU*

III. Examples of first-year program changes that were sparked by OREE

The OREE participants each had elements of a first-year program at their institution. Because of this common element, it is one area where ideas could easily be implemented. Some of the changes sparked by the group were in the area of knowledge generation.

> *"By collaborating on a paper related to engineering major selection it was helpful to understand similarities and differences in programs despite program / university structure. For example, we found that first-year engineering programs are polarizing so in all universities the majority of students shifted to the extremes of responses (either very certain or very uncertain of engineering). As educators, it's important to recognize that is 'universal' and a natural process for students which helps in advising." – Kerry Meyers, YSU*

While other changes were more curricular.

> *"One change implemented in the first-year program at UC, though not directly related to OREE work or discussions, was to offer an alternative method for*

students to prepare for lecture in the flipped classroom implementation in the ENED1090 Engineering Models I course. The paper that we wrote for ASEE last year on the students' attitudes towards the flipped classroom showed that many students had issues with the approach. On a separate survey that we did to evaluate the course, we found that many students wanted something more active with which to prepare than simply watching videos, so we created a MATLAB app that mimics the type of instruction provided though Codecademy.com … The work that we did in OREE for the flipped classroom paper motivated us to look for ways to make the students' experience better, even if the ultimate change didn't originate in that work." – Greg Bucks, UC

"After talking to Greg Bucks at ASEE 2015, I learned that University of Cincinnati uploads their MATLAB course content to the Mathworks website. Through this, I found a game project that I will be looking to pilot in my first-year engineering course in the fall." – Krista Kecskemety, OSU

Finally, other changes were more structural and higher level in nature.

"After discussing first-year engineering with members of OREE, I started to reflect a lot more on what we do and why we do it. If I couldn't find a clear 'why' on why something was the way that it was, I would discuss this with my colleagues, and we would make changes if needed. OREE re-sparked this inquisitive nature I have about first-year engineering and higher education in general." – Rachel Kajfez, OSU

IV. Suggestions to others starting a similar group

Suggestions to others starting a similar group would be to recruit many participants and have a clear structure for the meetings and a leadership rotation.

"Find someone who is willing to be the organizer. Without one person taking the responsibility to coordinate schedules and set meeting times, nothing will ever happen." – Greg Bucks, UC

"Don't be afraid to reach out to those you've heard of to see if they are interested in participating. I was surprised that so many people were feeling just as I was and were very interested in being part of a group like this." – Rachel Kajfez, OSU

"Have a formal meeting structure with a leadership rotation. Having a set meeting schedule as well as leadership roles that rotate will mitigate the issues with scheduling and follow through. Additionally, it seemed to be a lot of work for one person to do so having extra leadership roles or rotating responsibilities would help alleviate this." – Krista Kecskemety, OSU

"Recruit as many participants as possible within the region that have similar objectives for first-year engineering. It would be most helpful to get referrals of other faculty that would be interested in participating (cold e-mailing was not effective)." – Kerry Meyers, YSU

V. Changes we plan to make moving forward

Many of the changes we plan to make going forward have resulted from this reflection and the suggestions to others starting a similar group.

"One major change we are planning to make is to identify grant opportunities and write multi-institutional proposals to increase the quality of research the group is able to do. This also will improve the profile and credibility of the group." – Greg Bucks, UC

"In the future, I would like to use another form of communication other than a conference call. While it worked in the beginning, I think a form of video conferencing or a platform that allows slide sharing would be better." – Rachel Kajfez, OSU

"We should develop clear roles and identify a set meeting schedule. I also think we should try to meet in person more often and return to the model of sharing research efforts during the conference calls." – Krista Kecskemety, OSU

"Dividing responsibilities so that everyone on the team has a project they are leading so that there is not so much burden on the leader of the group in a volunteer situation." – Kerry Meyers, YSU

CONCLUSIONS

Overall, OREE has been a success from the view point of the participants. It allows a venue for those interested in engineering education research to connect in a meaningful, informal, and regular way. While there are changes that we would like to make to the group (such as including more members and meeting more frequently), we believe our experiences can serve as a source of information and inspiration for others who are interested in started such a network.

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