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There and Back Again: Lessons Learned from Facilitated Faculty Discussions on the Move Online and then Back Face to Face

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Dr. Tracy Hammond is the current Secretary of the Faculty Senate and passionate about Faculty governance. Hammond is Director of the TAMU Institute of Engineering Education & Innovation and Professor of Computer Science & Engineering. Hammond holds a Ph.D. in EECS and FTO (Finance Technology Option) from MIT, and has four degrees from Columbia University: an M.S in Anthropology, an M.S. in Computer Science, and a B.A. in Mathematics, and a B.S. in Applied Physics and Applied Mathematics. Hammond has received over $13.5 million in research funding from NSF, DARPA, Google, Microsoft, etc. Hammond mentored 17 UG theses, 29 M.S. theses, and 9 Ph.D. dissertations. Hammond is an ACM Distinguished Member, has received numerous best paper awards, and is the recipient of the 2022 TAMU Distinguished Achievement Award for Teaching, the 2021 ASEE Chester F. Carlson Award, the 2020 TEES Faculty Fellows Award, and the 2011 Charles H. Barclay, Jr. '45 Faculty Fellow Award. Hammond has been featured on the Discovery Channel and other news sources. Hammond is dedicated to diversity and equity, reflected in her publications, research, teaching, service, and mentoring. She has also been recently appointed as the Speaker-Elect of the Faculty Senate. More at http://srl.tamu.edu and http://ieei.tamu.edu.

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Randy Hugh Brooks (Professor)

Howdy, After 23 years in Telecom building LD, internet, and email platforms and networks, I observed that the front line personnel that I was hiring didn't have what I considered to be skills that they should be bringing to the table. I began investigating why, and that led me to high school. Alas, I began my journey in Education in 2010 inhabiting the classrooms of Lovejoy High School, where my two daughters attended. I redubbed my PreCalculus course as Problem-Solving with Brooks and was also afforded the opportunity to lead an impactul Project Lead the Way (PLTW) Principles of Engineering (PoE) course, a project-based learning survey of the engineering discipline. Since the Summer of 2015 I have been privileged to work with the Texas A and M Sketch Recognition Lab (TAMU SRL) to evaluate a couple of online tutorial tools (Intelligent Tutoring Systems (ITS)) currently under development, Mechanix and Sketchtivity, that provide immediate constructive feedback to the students and student-level metrics to the instructors. I presented on this work at the state and national PLTW Conventions and at CPTTE in 2016. I also spent 5 semesters beginning the Fall of 2015 taking online courses learning how to construct and deliver online courses. This resulted in a MSEd from Purdue University in Learning Design and Technology (LDT). This widely varied background prepared me well for my next big adventure. Beginning in August 2018 I became the Texas A and M Professor of Practice for the Texas A and M Engineering Academy at Blinn College in Brenham. Texas A and M Engineering Academies are an innovative approach to providing the planet with more Aggie Engineers. My research focus is enhancing the high school through first-year college experience and am an engaged member of the Texas A and M IEEI (Institute for Engineering Education and Innovation). My foundations were set by an upbringing on the family ranch near Joshua, Texas and 4 memorable years at Texas A and M where I met my wife, I led Bugle Rank #7 in the Fightin' Texas Aggie Band (Class of '86 Whoop!), and dove into Telecom Engineering. Once in Telecom, my learning continued at MCI, Vartec, and Charter.

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There and Back Again: Lessons Learned from Facilitated Faculty Discussions on the Move Online and then Back Face to Face

Abstract

In this Lessons Learned paper, we explore the themes uncovered from a series of facilitated faculty discussions on moving their course back to face to face teaching after the switch to online. The Institute for Engineering Education and Innovation (IEEI) at Texas A&M University (TAMU) administrates over 100 faculty whose primary department appointments and teaching assignments are in either engineering or education. Over the last two years, IEEI hosted numerous conversations for faculty members to share experiences, research, and assessments of teaching successes and concerns as they changed instructional modalities, both with the initial move online and the subsequent move back face to face. From these conversations, faculty agree that some things during the move to online instruction, such as office hours, video archives of lectures, and some activities in break-out rooms appear to enhance student learning. Yet data showed that students believed the online experience was less desirable than face to face courses. Now that we have had a near complete semester where most classes were required to be held in the face to face mode, we are hosting conversations with faculty to understand the changes they are now making to their teaching because of the experiences from online instruction. The results will be shared as a "lightning talk".

Introduction

The pandemic and sudden shift to online learning has challenged the educational realm in many ways giving us an opportunity to rethink the various practices that we use in classrooms to enhance student learning. IEEI at TAMU administrates over 100 faculty whose primary department appointments and teaching assignments are in either engineering or education. Over the last two years, IEEI hosted numerous conversations for faculty members to share experiences, research, and assessments of teaching successes and concerns as they changed instructional modalities, both with the initial move online and the subsequent move back face to face. From these conversations, faculty agree that some things during the move to online instruction has the potential to enhance student learning. This paper brings together the experiences of four engineering faculty members belonging to the TAMU about some of the techniques that were found beneficial during remote online instruction that we are still continuing after the recent shift to complete face to face learning at TAMU.

From our weekly conversations, some of us agree that some techniques that we utilized during the move to online instruction, such as office hours, video archives of lectures, and some activities in break-out rooms appear to enhance student learning. Although online experience was less desirable than face to face courses for most faculty members as well as students, there were some

lessons from our online experience that we are still continuing to use after our move back to traditional in person learning.Now that we have had a near complete semester where most classes were required to be held in the face to face mode. We are writing this paper to summarize some of the conversations we have had during our weekly engineering education faculty meetings that we believe will be beneficial to the rest of the higher education community.

Lessons Learned by a Group of Engineering Faculty

There were several lessons we as a group of Engineering faculty at TAMU have learned together during the sudden shift to online learning as a result of pandemic. In this paper, six of us have come together to discuss some of the beneficial teaching techniques that we are currently continuing to utilize in the face to face instruction that we learned during remote online instruction. Below are some of the techniques instrumental to student learning to promote enhanced student learning. These include virtual office hours, polling, guest speakers, introduction surveys and pre-course prep sessions, flipped classrooms, and gallery walks and multimedia artifact submissions.

Virtual Office Hours. The nature and frequency of faculty-student interaction has the potential to make a positive impact on undergraduate student's social, personal and academic outcomes [1]. Many instructors started utilizing virtual office hours for the first time during the forced transition to online learning. The value of holding virtual office hours through Zoom was one of the lessons we as a group at TAMU learned during the period of forced online transition that could be useful for students even after our shift back to traditional in-person learning. The underutilized medium of communication for promoting faculty-student interaction was instrumental in enhancing student learning. The virtual nature of office hours provide a unique way of access and convenience to students. Several pre-pandemic studies [2], [3], [4] have also shown the benefits of holding virtual office hours. For example, [4] found that students who utilized virtual office hours had elevated levels of comfort and confidence during in-class discussions. Students can now hop in the office hours between classes and effectively share screens while speaking.

Polling. The Zoom poll feature is another tool that has been widely used by faculty members during remote zoom lessons for enhancing student engagement. One of us had never used polling in classrooms before the forced remote transition but started utilizing the zoom poll feature for the purpose of enhancing student engagement. Shortly after, it was found to be beneficial for starting conversations/discussions about a topic during lessons and continues to be utilized even after we have shifted to in-person learning. Recent studies have examined the benefits of poll features as assessment tools beyond promoting student engagement [5].

Guest Speakers. Bringing guest speakers from industry to classrooms is of tremendous benefit to students in their learning as well as for expanding their professional network [6, 7]. The online learning platform has paved a way for this to happen smoothly in classrooms and faculty meetings, which was not so common in the past. Virtual meetings held during these times trained us on how to have more fruitful discussions even with industry mentors who are located distance away. As guest speakers no longer have to travel to campus for giving lectures, there is more possibility for inviting and scheduling a time where they can give lecture and interact with students. Although, we have shifted back to face to face course delivery mode, we still continue to utilize technology to facilitate events where guest speakers from different part of the world are invited.

Checking in on Students. Zoom made it convenient to record attendance and check in on absent students. Since we had the digital attendance record, some of us began to track attendance (even if not for a grade) and reach out to students who had not come in a week or had unusual attendance patterns. This was very effective in bringing students back in/reengaging them in the course. Since, this was so impactful, some of us are continuing to do this in physical classes (even large enrollment ones). Although, we don't have Zoom, we have found other ways to get the data, either through daily quizzes (if they participated or not) or class activities that require some sort of submission.

Introduction Surveys and Pre-Course Prep Sessions. One of us started using introduction surveys to address student concerns about remote instruction. Surveys are a powerful tool to access student background, access, and give students an outlet to express concerns [8, 9]. Surveys asked students if they had the necessary access, had equipment required for learning, and could see announcements in the learning management system, as well as questions to get to know them better. This helped the instructor identify technology and/or access issues early on and get students the equipment and/or help they needed. The instructor got the opportunity to personally email students who expressed concerns to also know them a bit better. Although, the introductory surveys no longer have the same content, the instructor is still doing this in physical classes that have now evolved to have a greater focus and influence on inclusivity goals. The instructor still continues to ask students to complete a Google survey on the first day of the class. The instructor finds it impactful to personally email students on the first week of classes addressing the specific individual concern they had. There might be instructors who practiced this pre-pandemic; however, for some of us, practices such as this were a result of the lessons learned during the forced shift to online learning.

Another instructor began holding virtual pre-course prep sessions to provide students with the opportunity to confirm (or establish) base knowledge and skills needed for the course. These were held in a variety of ways (synchronous, asynchronous) depending on student needs. Although initially implemented to address knowledge and skills deficiencies expected as a result of pandemic challenges, the benefit of offering students an opportunity to be better prepared for the semester is proving impactful and of interest to the students. Going forward, it is helpful to continue to hold these sessions virtually to accommodate the varied student move-in challenges. This gives the greatest access to all students, regardless of their travel plans or work constraints.

Flipped Classrooms. The benefits of flipped classrooms have been long touted by the education community [10, 11], but many instructors are often intimated by overhauling their entire course for this instructional model as it requires a significant amount of work to prepare the first time the course is offered this way. As the pandemic forced faculty to shift to online learning, many took the opportunity to reevaluate their approach and make the move to a flipped classroom. One instructor recognized first-hand how much more effective flipped learning is for her students and she has decided not to return to lecture but to continue with this instructional model. "Not only is the approach more effective for my students, it is more fun for all of us — including me — as well. I don't ever want to go back to my previous way of teaching."

Gallery Walks and Multimedia Artifact Submissions. Pre-pandemic, many instructors use in-person student presentations to assess student work and promote student-to-student interaction. While these can be conducted remotely through Zoom, it is more difficult to keep students engaged than in person. One instructor instead created gallery walks on the course's discussion board. Students can easily share multimedia products with each other and comment on each other's work. Because

the discussion board is persistent, students can come back to it after the session and continue the conversation if they want. It also allows sharing of ideas when the course is asynchronous.

Another instructor moved away from multiple choice tests and replaced them with multimedia artifact submissions. These submissions represented student mastery and were a more effective tool for summative assessment than the previous approach. The artifacts consisted of the student engaging with the material in such a way that they share what they know of foundations, walk through several applications, and then discuss how the concept might be applied in a new environment.

Conclusions

In this Lessons Learned paper, we summarized the lessons we learned at TAMU from our experience with online engineering education that could benefit other faculty members across United States as they shift their course delivery back to face to face after online learning.

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