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Expanded Advice from Coordinators of Large-enrollment First-year Engineering Courses

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Abstract

This paper expands upon the coordination experiences and best practices of faculty coordinators within the Department of Engineering Education at Virginia Tech, some of whom have been managing large enrollment introductory engineering courses for several years[1]. Since 2012, enrollment has increased from 1200+ to 1700+ students. In fall 2013, the courses underwent a significant change in curriculum and the format of the delivery to students. New challenges for coordination arose due to increasing enrollment, technology-related modifications, significant alterations to the curriculum, and availability of lab resources for prototyping and testing. Also, the department piloted a way to increase instructor autonomy while considering the role of coordination. This paper addresses some of the basic issues that those teaching common courses have such as fairness across sections and orientation of new instructional staff [2]; the focus is on experiences and practices that address more recent changes to the course. The authors aim to describe strategies to enhance the quality and efficiency of the management of curricular content, training of personnel, and overall logistics that other course coordinators may find useful.

Introduction

The term course coordinator may have different meanings in the literature. Some authors use it to describe a person who is in charge of a course that may or may not include multiple sections of the course. Others use the term to describe a person who oversees a course that is taught modularly by multiple faculty. To some, the terms appears to mean anyone who develops curriculum for a program or course. We will use course coordinator to describe someone who in charge of a team of instructors teaching the same common material across multiple sections.

Our literature review found limited supporting information specific to course coordination. A few publications focus on course coordination in engineering courses [3, 4] and non-engineering courses [5, 6, 7] and incentives for coordination [8]. Ladyshewsky, et. al, acknowledge the stressful demands of the role of course coordinators and the leadership skills necessary to be a successful course coordinator [9]. Hill, et. al, describe development sessions that can aid in improving the leadership skills of course coordinators [10]. Timpe provides newly assigned college of pharmacy course coordinators a number of keys items to consider including communication with students and colleagues, finding a mentor and assessment [11]. Bullock, et. al, describe a list of guidelines that course coordinators can give to new instructors to reduce time spent on problems that can be avoided [12]. Strong, et. al, note grade differences between coordinated and non-coordinated course sections and the impact of coordination on matriculation [4]. Most relevant to this paper, in 2009, Thompson, et. al, provide details of a model of coordination that worked for their first-year engineering course [3]. This paper adds to the body of knowledge with respect to best practices for course coordination, particularly with respect to information sharing among the instructional team, common test writing, strategies for training and mentorship, and management of supplies, lab access and prototype testing.

This paper focuses on recommendations based on personal experiences by four faculty, two of whom have 10+ years of course coordination experiences and two of whom have less than 3 years of course coordination experience. While some suggestions are being implemented in spring 2016, most of the challenges, solutions and lessons learned that are presented in this paper are based on first-year course offerings at Virginia Tech in 2015.

Background

Within the last three years, our department has undergone a significant review and revision of the curriculum of its large enrollment first-year engineering courses. In the "on" semester of our course, the format is two weekly 75 minute meetings of 30-seat sections. In the "off" semester, the format is one weekly 75 minute meeting of 120-seat sections and one weekly 75 minute of 30-seat sections. In fall 2015, enrollment in the "on" semester sections is ~1750 students while the "off" semester sections consists of ~300 students.

EngE 1215: Foundations of Engineering I
This course focuses on engineering as a profession, problem solving skills, data analysis, and algorithm development. New changes to our course include the addition of product archaeology; increased emphasis on information literacy; incorporation of Arduinos and ultrasonic sensors to collect experimental data; and use of Arduino-based robots with infrared sensors to teach programming concepts and feedback systems. Product archaeology has been used to understand global, economic, environmental and societal factors that go into product design [13,14]; we used this approach to not only discuss design considerations but also to teach information literacy.

In fall 2015 (on-semester), there were 22 instructors (12 faculty and 10 graduate teaching assistants (GTAs)); of these, less than half had taught the class prior to fall 2015. In spring 2016, there are 4 instructors (1 faculty and 3 GTAs);of these half have not taught this course before and one is new to the Virginia Tech this semester.

EngE 1216: Foundations of Engineering II
The second course in the first-year sequence continues to introduce general engineering students to the engineering profession. This course focuses on engineering design, mathematical modeling, contemporary software tools, and professional practices and expectations (e.g., communication, teamwork, and ethics). During the most recent curricular revision, there is increased emphasis on Project-Based and Problem-Based Learning and mathematical modeling.

In fall 2015 (off-semester), there were 5 instructors (1 faculty, 4 GTAs); of these, three quarters had taught the course previously. In spring 2016 there are 23 instructors (12 faculty, 11 GTAs); of these, half have not taught this course before, and two are new to Virginia Tech this semester.

Training and mentorship

Tables 1 and 2 describe challenges related to training a number of new instructors while being cognizant that instructors come from a wide variety of teaching experiences and familiarity with the course being taught. Other issues arise when second semester instructors are new to the

university, as training is not as in-depth in the pre-spring as it is in the pre-fall semester due timing issues and a lack of overall need. However, having a few brand new instructors complicates the information transfer and increases the training demand in a shortened time span. Table 1 addresses pre-semester training issues, while Table 2 focuses on continual training issues throughout the course.

Table 1. Pre-Semester Solutions to Training and Mentorship Challenges and Lessons Learned

Challenges faced	Our solution	Lessons learned
GTAs and faculty contracts started a week prior to the start of classes, thus limiting training options.	We provided concise training in a three-day bootcamp. It provided an overview of policies, the course project, the learning management system, and university online recordkeeping systems, as well as prepared instructors to teach the first two weeks of course content.	Instead of relying on coordinators to do all training, departmental experts led some sessions. This reduced monotony for attendees and leveraged expertise of colleagues. We found that if bootcamp is optional, those missing training are behind.
Instructors had a wide variety of background knowledge of our course content and policies.	Deliberate decisions were made on which bootcamp training sessions had to be attended by all instructors, only new instructors, and only returning instructors.	In fall 2015, we allowed returning faculty the option of skipping training; in retrospect, all instructors should attend all training meetings - thus sparing coordinators from readdressing questions posed during meetings.
New faculty hires and GTAs are required to have additional training and orientation from the university.	In weeks leading up to semester training, we hired a training coordinator (not the course coordinator) to schedule course specific training that did not conflict with Human Resources training, Graduate School training, graduate student orientations, etc.	Some institutions may provide TA training. If so, it is important to understand what that training entails to avoid redundancy.
New Spring instructors had missed Fall training that is not repeated.	An experienced person, who is not the coordinator, is assigned to mentor new instructors and answer procedural questions.	Consider holding additional training pre-semester to cover issues addressed in the fall directed towards new instructors.

By implementing a pre-semester training program and preparing all instructors with knowledge on general university, departmental and course procedures prior to the start of the semester, many issues are resolved and instructors can focus on students and student learning. In addition, we try to cover the first two weeks of course material as well as an overview so that instructors are prepared for classes and to answer student questions.

Table 2. During Semester Solutions to Training and Mentorship Challenges and Lessons Learned

Challenges faced	Our solution	Lessons learned
GTAs and faculty needed different resources due to differences in time commitment, experience, and evaluation.	Our department assigned a faculty member to act as a liaison to GTAs. This person conducted informal observations of GTAs, coordinated the formal observations of GTAs, and was the initial point of contact for GTA questions related to the course. Mid-semester, the liaison met with each GTA to discuss concerns about the course or students.	This person needs to consider ways to be easily available for private meetings with GTAs as some GTAs needed to discuss students who had sensitive issues. Also we recommend a group meeting with GTAs weekly to give GTAs a forum that is free of administrators. The liaison should be someone that has a good rapport with graduate students.
We hired a group of new instructors, who were not familiar with our courses.	While there had been precedence within our department for faculty mentorship, it is only recently that we started assigning GTA mentors who have taught for us before to new GTAs as peer level contacts.	It was important to assign mentors to new instructors. If instructors have offices in different locations, proximity of mentors and mentees should be factored into pairing mentors.
We needed to have more efficient weekly training meetings. We spent meetings going through all common slides and then discussing high priority announcements and decisions.	Midway through fall 2015, we changed the format so that everyone had to review slides prior to the meeting and then used the meeting time to allow Q&A on slides. The new format reduced the meeting time by at least 15 minutes. In addition, midway through spring 2016, we began providing narrated slides prior to the meeting.	We allowed instructors to vote on the format change to gain buy-in. Providing documents with annotations (voice and/or significant written notes) that help instructors understand the material is more beneficial to new instructors than just a meeting review and serve as an instructor resource outside of the meeting.

Involving partners external to the course (library, assessment, advising, campus labs, etc.)

Below, Table 3 explains some issues with working with other university offices and personnel. Our department partnered with various offices to enhance instruction and assessment of our program. While the intent was to leverage the expertise of personnel outside of our department, we discovered that communication with these university partners needed improvement. In addition to our out-of-department partners, such as the university library system, we work extensively with departmental partners, such as advisors and lab personnel. We are working to find meaningful ways to connect external partners to the course and to have positive interactions with the students. Providing students with links to resources they may not be aware of or reminders of university calendar deadlines, links our courses with the university community.

Table 3. Solutions to Challenges Arising from Working with Partners and Lessons Learned

Challenges faced	Our solution	Lessons learned
Instructors needed to teach material that were not in their area of primary expertise. (examples: information literacy and lab training)	We worked with our College Librarian to prepare a website [15] directed towards how to conduct research in general as well as using specific university resources, which was referenced throughout both courses. When needed, the College librarian held office hours specifically for our students. Our first year lab director created a video to showcase available options and how to access them.	Who leads instructional activities depends upon the availability of the expert and number of sections. With a small number of sections, the expert may be able to personally conduct class activities with students. For a large number of sections, other options can include real-time online instruction by the expert, videos, and/or having the expert train our instructors to deliver content.
External partners did not fully understand our courses.	Whenever we worked with external partners (outside of the course), explaining the objectives of the course, deadlines and time requirements was essential.	Guest speakers are more effective when they understand their audience (maturity, knowledge, expectations); in the future, debriefings with partners would be useful to share suggestions.
We needed to connecting students in a streamlined way to university advising, calendar, tutoring services and counselling.	Our department has a strong advising team that works with first-year students on course registration, academic plans for study, major choices, etc. To streamline communications, we provided an advising tip of the week with timely information and resource links. We also have other departments and resources that want to send information through our classes.	Directly connecting students back to university issues, university deadlines, and resources in a purposeful manner improves students' connections to the course and the university. A streamlined, reliable method of delivery for such announcements should be considered.
We needed additional personnel to help us assess our courses.	We partnered with the Office of Assessment to leverage instruments that their office had already developed to test information literacy. We also asked the office to conduct focus group interviews with our students during spring 2015.	While the Office of Assessment could help with some course assessment, we conducted our own entrance and exit surveys, which allowed us to more quickly modify instruments and access results. These should be separate from teaching evaluation to allow students to provide content input.

Information sharing

We recommend coordinators use an online file sharing system to record, share and promote communication with their instructional teams. Determining key documents for the course should be considered at the beginning. Too many files can become difficult to manage and may overwhelm the teaching team. In the past, we primarily sent emails and posted materials to our learning management system. Keeping track of emails and revisions was cumbersome. Now, a shared Google folder dedicated to the course makes file management and locating easier. In Table 4, we provide a list of our Google Drive information that is likely to be generalizable to other large coordinated engineering courses.

Table 4. Communicating Different Types of Information to an Instructional Team

Information to be shared	Format of delivery	Details
Instructor contact info	Google Spreadsheet with multiple sheets	This file recorded instructor availability for covering each section in an emergency, contact information of each instructor, instructor expertise, office hours attendance, grade averages, grade disputes for common tests, and more.
Feedback about classes	Google Documents	This file shared feedback regarding each class lesson. We asked instructors to voluntarily complete: A) Suggestions of things to consider before teaching B) Feedback from those who have already taught C) Suggestions for changes for future semesters We noticed heavier participation with respect to voluntary feedback at the beginning of the semester than at the end.
Meeting agendas and minutes	Google Documents	This was useful for instructors who were absent from weekly training meetings as well as for instructors who wanted to review discussions afterwards. One co-coordinator would lead the meeting while another would fill in the Google Document with details and decisions that had been conveyed.
Common testing info	Google Spreadsheet and Google Documents	The spreadsheet informs instructors of room reservations for common tests and record student problems while a Google Document was used to record test questions that instructors created that could potentially be used for common tests.
Procedures for using instructional software	Google Documents	These files explained how to create Learning Management System (LMS) sites with recommended course settings, how to grade, and how to export grades for use with our university systems. In addition, we kept a running Q&A sheet where any instructor could ask a question and those with more experience could respond.

For exchanging course documents and materials, we maintained two "sites" on our LMS. One included weekly folders were used to contain all instructional material (assignments, course documents, rubrics, solutions, presentation slides, etc.). A separate template site that mimicked what students should see was provided for instructors to copy weekly content to their own sites. Once course materials were finalized, they were copied to the template site so it was clear to all instructors that final documents were ready for posting. Materials not intended for students, such as rubrics, solutions, etc., remained on the instructor only access site to avoid releasing information to students.

Assessment

While we have not yet linked together our new course management system with our course outcomes, this is the next logical step. Canvas has the ability to upload course objectives and outcomes and tie every assignment to the correct course outcome. This will help coordinators to evaluate objectives that are under or over assessed. In addition, combined with the ability use Canvas for digital testing, this should simplify test analysis.

As mentioned previously, we have partnered with our institution's Office of Assessment to handle some aspects of assessment of student learning and student perception. Since our department plans to publish research results related to the course and enrollees, it was important for our department to have an overarching IRB plan. One of the first activities in the class is to have students fill out a consent form.

Common office hours

Coordinators need to consider student accessibility to office hours. While we encouraged students to meet with their own instructors outside of the classroom, we realized that students could benefit from access to office hours conducted by other instructors too. For general questions about homework assignments or course concepts, students were encouraged to attend any office hours that fit their schedule, not just those hosted by their instructor of record. Students were told that if they had questions about a grader's comment, their academic performance, or their team project, they should contact their instructor of record instead of using the common office hours. We recognized that some instructors would need to meet privately with some students; this was accounted for in assigning the required number of common office hours per instructor and students are encouraged to email their instructors with questions and to set up appointments for discussions that are not suitable for email. In addition to office hour questions, some students just wanted a dedicated space to work with other first-year engineering students, but still have access to knowledgeable staffers. This venue was specifically geared towards students who wanted to continue to work on project requirements that extended beyond in-classroom instructional time. This space can also be used for asking questions about basics, to catch up with classmates, or to explore concepts beyond the course curriculum that interests students. Table 5 describes some of items considered in implementing a model of common office hours.

Table 5. Solutions to Challenges from Implementing Common Office Hours and Lessons Learned

Challenges faced	Our solution	Lessons learned
Instructor offices (cubicles) were not suitable for office hours.	We used common office hours open to all students enrolled in the course. We posted schedules with times, locations, and staffing.	Try to secure the same location for all office hours so that students only need to remember one location.
There was limited staffing existed for office hours; it was not possible to offer office hours during all business hours.	We consolidated office hours to Sunday-Wednesday, making assignments due Wednesday and Thursday mornings.	We asked instructors to record the number of students attending office hours to determine which times were most used by students for future reference. Weekly spikes in attendance pinpointed which material students were struggling with to allow coordinators to make future revisions to the assignments and/or presentation of the material.
Due to large enrollment, office hours could attract a large number of students at a time.	We reserved classrooms with 20-30 seats, close to the our university's academic quad, and with blackboards and/or whiteboards. We paired personnel for office hour slots.	We paired inexperienced personnel with experienced ones. This way instructors less familiar with material can see how experienced instructors answer questions. For many instructors, this became an opportunity for unofficial mentoring.
Some students wanted additional work space for student projects, with access to staff.	The department offered evening homework lounge hours, staffed by upper class undergraduate engineering students.	The staffers needed refreshers on some course content. Unfortunately, no record of attendance was kept, which is something we wish to change in the future so we can determine what hours/days are most popular with students.

Common tests

Our courses involved common time tests that are often a combination of multiple choice, fill in the blank, and workout questions as well as practicals that require students to code problems or to draw objects in a CAD system. Table 6 addresses some of the development and implementation issues arising from the creation and deployment of common time tests.

Table 6. Solutions to Challenges Related to Common Tests and Lessons Learned

Challenges faced	Our solution	Lessons learned
We needed a variety of test questions.	We requested each instructor to submit at least two test questions per week to the Google Document covering the week's material.	Only about half of instructors contributed. We plan to personalize reminders and assign test topics to each instructor.
Historically, having 20+ instructors review a test led to long and unproductive discussions.	For EngE 1215, the faculty split into 3 teams, one per test. Each team used contributed test questions, but were ultimately responsible for creating and printing the final version(s) of its assigned test.	We recommend assigning a lead for each team-writing team, preferably not the coordinator. This team should create the solutions and rubrics for grading the tests as part of the test design.
Instructors who weren't directly involved in compiling the test still wanted to provide feedback.	Any instructor could express concerns about any questions that had been submitted to the Google Document by leaving a comment. The test-writing team could take comments into consideration.	Provide a deadline for comments prior to review by the test creation team and then provide time for a final review of selected questions as needed.
A large number of scantrons needed to be graded. One person was responsible but this required collection of forms and authorization to access student IDs and secure distribution when complete.	Each instructor was responsible for grading scantrons for their sections. The new approach eliminated issues related to having one person be solely responsible for all scantron scoring but meant that each person needed to be trained to use the scantron scoring equipment; training documentation was developed and made available to instructors.	Use an LMS and lockdown browser to facilitate digital tests. This approach was used by one instructor and received positive feedback from the students and instructor. Test questions still need to be generated. There will be some training for instructors on use and implementation, but this can reduce photocopying and hand grading.
Hands-on practicals (for us, CAD and programming) were difficult to create and grade.	We had a subset of faculty create and edit practicals. Multiple versions of the test need to be created for the testing window and another version is created for make-up exams. Grading is simplified by using a standard test set of data.	Some instructors asked their graders to run the test data and sort the students' tests into two piles (correct and incorrect) to streamline instructor grading time and to provide feedback to students quickly.

Supplies and materials

As course curriculum and enrollment numbers have changed, we have encountered new challenges to managing supplies and materials needed for hands-on activities that are part of the in-class instruction; these are noted in Table 7.

Table 7. Solutions to Various Challenges with Providing Supplies and Materials and Lessons Learned

Challenges faced	Our solution	Lessons learned
Increasing enrollments meant more supplies needed to be purchased and organized.	We have gone through different approaches for managing materials, from giving a graduate TA a reduced teaching load so that they could manage supplies to having a Lab Manager oversee supplies. The bulk of our supplies are located in a small room near our classrooms. It consists of several tables and chairs, a number of bookshelves and mailboxes. The room was originally designed with the primary purpose of serving as a storage space and being a distribution center for weekly classroom supplies.	Over time, the supply room evolved into a workspace for instructors and became an impromptu meeting space. Because of the many classroom supplies and users, guidelines were set for etiquette and placement of supplies (one week of class materials was in the front of the room; all other supplies were stored in the rear). We plan to redesign the room to facilitate supply access and to make the room more comfortable for those instructors using the space between classes.
Evolution of courses led to storage of unneeded supplies.	Instructors had instructions on what was acceptable to throw away in terms of supplies, and one person had the authority to make final decisions to keep or dispose of equipment and/or bulk supplies.	It would be helpful to create a Google Document with a current list of supplies, quantities, condition, and classroom uses to be updated each semester.

Resources for prototyping and testing

Within the past two years, our department overhauled our Frith Lab to become a maker space [16]. Construction of the prototype required the students to use the Frith Lab, a space that contains conceptual design tools and machines such as 3D printers, laser engravers, CNC machines and other assorted tools. The space is relatively small in square footage (~1500 square feet of student workspace), and as such only a limited number of students can be in the lab at any given time. Students may use the space to work on personal or course projects. Table 8 underscores some of the challenges of limited resources, from a coordination standpoint.

Table 8. Solutions to Challenges related to Providing Resources for Prototyping and Testing, and Lessons Learned

Challenges faced	Our solution	Lessons learned
Increasing enrollments and limited lab space required new protocols for student access.	Due to large enrollment numbers, students were asked to view an online video of a tour instead of take a tour in person. To streamline the process in design and prototyping classes, we are asking design teams to elect one representative to attend training for a machine early in the semester prior to heavy use of the lab. This will decrease the demand while still allowing each group lab access. Students are required to sign up for time slots to use the lab during peak weeks of usage.	Completing training on their own in the weeks leading up to the prototyping assignment will allow lab personnel to balance their time better throughout the semester and be available for hands on help during prototyping activities.
Coordinating the off-site testing physical prototypes for a large number of groups in a short time frame can be difficult.	Keeping the test location relatively close to labs or machine shops allows students to test their designs, make adjustments as needed, and retest with the modified design potentially in the same test day. We have the students do basic fit and systems checks of their models prior to coming to the test location to help ensure that students have a viable design prior to coming to the test location.	If there is a plan to work with 1000+ students on a project, the project should be piloted with a smaller but substantial group of students (200-300) to better understand what issues related to a project are, to test out plans, and to handle any unforeseen problems that arise. The lessons learned from this experience can be used as a basis for planning for the large scale deployment of a project.

For off-site testing, the specific needs of the project should be matched with the needs of the class and the resources available. Due to the nature of our prototype testing, we worked with university facilities to find a space large enough to accommodate the test and nearby so that students could walk to the location (eliminating off-site transport of students). Student teams signed up for 30 minute testing time slots. Course instructors came to the test field during scheduled time slots to continue their facilitator role in the PBL model we used in EngE 1216 and to keep things moving smoothly during the tests. This aspect, combined with having instruction staff trained on what to look for during testing, can help make the testing experience an engaging and positive one for both students and instructors. For every project, considering access, timing, resources and success is important.

Instructor autonomy

Historically, instructor autonomy has been a recurring topic of discussion in our department. The American Association of University Professors has advocated for a high degree of instructor autonomy for all faculty [17]. With many instructors being graduate students genuinely interested in teaching (pursuing a graduate certificate for future professoriate, or a certificate or doctorate in engineering education) and seasoned faculty who have strong feelings on curriculum, coordinators must decide what level of deviation from common material is acceptable. Table 9 consists of items to consider when acknowledging instructor autonomy.

Table 9. Solutions to Challenges Associated with Instructor Autonomy and Lessons Learned

Challenges faced	Our solution	Lessons learned
New instructors felt limited in their pedagogical approaches and delivery of provided content but wanted to make sure students were prepared for common tests.	New instructors were asked to follow the given materials and lesson plans, so that they could become acquainted with activities that were originally designed to address course objectives. They were allowed to change the order of provided slides and given specific instructions on which slides and activities could be altered or eliminated.	One advantage of having everyone agree to a common syllabus and materials is that if any instructor is absent from class, other instructors easily substituted for that instructor. Mentorship and weekly meetings helped reinforce what material could be altered.
Experienced instructors often desired increased autonomy.	Returning instructors were given more latitude with deviations from the planned materials. Departmental administrators required permission to deviate substantially from the provided course content; instructors deviating had to agree to a detailed list of course objectives and use a portion of the common test.	One major suggestion is that instructors who desire significant deviations from the common materials work closely with a fellow instructor. That way, if one instructor is absent for an extended period, another instructor is aware of the changes and can easily fill in. Also, keeping these instructors engaged with test writing and other team events is worthwhile to foster a sense of community.

Summary

Coordinators need to find strategies to better manage time and resources, which will benefit instructors and students. Here, we summarize some key lessons learned. All instructors need to attend training to reduce redundancy and to provide feedback to the group in a timely manner. Streamlining and organizing communication through use of shared online documents (such as those through Google Drive) reduces the time instructors spend looking for information and

provides consistent messages to the instructional team. Close coordination with external partners improves relevance to instructors and students. Building a team environment, where feedback is expected and used regularly to promote positive changes, helps foster success for instructors and students. In addition, providing mechanisms for mentorship (formally and informally) for faculty, teaching assistants and undergraduate graders/assistants is vital to providing instruction in a cohesive program. Continuity of a large program across multiple sections is facilitated by common time office hours that provide access for students to all instructors while resources and common tests create a unifying platform for all participants. Protocols for managing course supplies should be clearly relayed to instructors to minimize time spent rearranging and reordering supplies. Prototype building and testing for large enrollment courses requires significant planning; local sites for labs and testing facilitate student access while having students perform virtual pre-test analysis can help improve testing results. In order to effectively conduct course assessment, planning of any instruments, analysis and required resources should be considered prior the start of the term. Instructors who deviate significantly from the proposed materials should work with a partner, which helps in instances of instructor absences and provides a second look at major changes.

While we acknowledge that different institutions have different specific challenges, nearly all challenges arise from the common problems of resource management including personnel, space and time. The lessons learned described above, though specific to our university, address these common problems and potential solutions can be easily adapted to help solve similar challenges across programs and universities.

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