Building Pipelines into High-Impact Learning Experiences

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Abstract

As colleges and universities increasingly emphasize the importance of High-Impact Learning Experiences (HILEs) in fostering deep learning, equity, and student success, a critical challenge persists: many students remain unaware of these transformative opportunities until later in their academic journey, if at all. To address this gap in early exposure, two complementary pedagogical approaches were piloted with the aim of cultivating interest and engagement with HILEs from the outset of students' college experiences.

The first, termed the Spark Engagement (SE) approach, involves integrating concise, student-centered modules into existing courses. These modules are intentionally designed to foreground HILEs and prompt students to reflect on their academic and personal goals through interactive, course-relevant activities. The second approach, Enlighten, Engage, Emerge (E^3), provides students with curated, discipline-specific examples of HILEs that directly connect with the material being taught in class, thereby making abstract opportunities tangible and relevant.

This article examines the conceptual foundations, implementation strategies, and preliminary outcomes of both SE and E^3. Drawing on qualitative and quantitative data from pilot implementations, it highlights effective practices, common challenges, and lessons learned. It also outlines plans for scaling and refining these approaches within and beyond the pilot institutions. Ultimately, this work aims to inform and inspire educators, administrators, and institutional leaders seeking proactive and scalable strategies to introduce students, particularly those from historically underserved populations, to the full range of high-impact educational opportunities available to them.

Keywords: student recruitment strategies, student engagement, undergraduate research, study abroad

1. Introduction

High-impact learning experiences (HILEs), including undergraduate research, study abroad, embedded travel courses, community-based learning, service learning, internships, and capstone experiences, enrich the student experience and prepare students to join the workforce (Kilgo, Sheets, & Pascarella, 2015). Despite myriad ways to get involved in HILEs, most students do not participate (Working Group for an Urban Research-Based Action Initiative, 2014). For example, according to the 2022 National Survey of Student Engagement (NSSE), while some HILEs have seen modest increases, significant gaps persist: among seniors at four-year institutions, 52% participated in undergraduate research, 71% in service-learning or community-based projects, 68% in internships or field experiences, and only 21% in study abroad programs (NSSE, 2023). These rates represent slow progress over the past decade, with study abroad participation remaining particularly low despite institutional efforts to expand access (Institute of International Education, 2023). Moreover, participation varies dramatically by student demographics, with first-generation college students, students from low-income backgrounds, and underrepresented minorities participating at significantly lower rates across all HILE categories (Finley & McNair, 2022; Kuh et al., 2023).

Why do so many students not participate in HILEs? Some students want to partake in community engagement efforts but struggle to integrate them into their busy schedules; others cannot afford travel-based experiences;

and others either do not know how to find out about HILEs or learn of them too late in their undergraduate career (Kuh, 2005; Garcia & Villarreal, 2022). This article focuses on tackling the third challenge: how do we enable students to realize the importance of HILEs early in their academic careers and discover opportunities they may want to pursue? Engaging students early in their undergraduate career is difficult considering what students are already facing in their first two years: learning to live away from home, adjusting to a heavier workload, and building new social relationships, with additional barriers faced by first-generation and underrepresented students (Elkins, Braxton, & James, 2000; Felten et al., 2016). In addition, it is difficult to find time with this student audience because they are enrolled in many general education courses, which have specific requirements to cover, leaving little class time to spare. However, getting students involved in HILEs early on in their undergraduate career leads to "positive, statistically significant effects on grades and persistence between the first and second year of study for students from different racial and ethnic backgrounds" (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008).

This article presents two approaches tested by Pennsylvania State University's Council on Engaged Scholarship to stimulate student interest in HILEs early on in their undergraduate career (i.e., in their first two years). The first approach, Spark Engagement (SE), entails embedding student-centered modules on HILE-relevant topics into cancelled or invited class sessions. The second approach, Enlighten, Engage, Emerge (E^3), entails incorporating vignettes of students' HILEs related to the course material into introductory courses. After reviewing existing approaches to proactively educate students on HILE opportunities, this article delves into the details of the SE and E^3 approaches along with initial assessment results, best practices, and future plans for each approach. These approaches are relevant to institutions looking for lean and scalable mechanisms to increase awareness of HILE opportunities for students early on in their undergraduate career.

2. Current Approaches to Recruit Students into HILE Programs

This section reviews and evaluates common approaches employed by institutions to recruit students into curricular and non-curricular HILE programs.

2.1 Non-curricular HILE Programs

Non-curricular HILE programs are defined here as student programs that are not tied to course credit. Such programs include student clubs, community service groups, Greek organizations, and special living options. Students involved in noncurricular programs are often motivated to join because they are career-driven and want to enhance their professional development as well as develop a sense of belonging and find opportunities to conduct service activities outside of their academic pursuits (Chen & Williams, 2019; Martinez & Thompson, 2020). Non-curricular programs recruit students through talking to interested students at involvement fairs, speaking with random students passing through common student spaces (residence halls, student centers, and dining commons), and inviting specific students.

Involvement fairs are events held by students to recruit peers into their non-curricular HILE programs. Students attend these fairs to investigate their options and where they should invest their time. While this method is often the most common way that students are successfully recruited into student clubs, community service groups, and Greek organizations, only students who are already motivated to get involved attend these fairs. Recruiting in student spaces includes students and residence life staff with flyers and tables that advertise their programs, catching the attention of students walking by. This reaches a more random sampling of students, but will likely miss audiences such as returning adult learners and students living and/or working off-campus that do not spend time in traditional student spaces. Recruiting specific students targets those who are friends with current members, have a family history in their program, and/or have expressed interest in the theme of the program. This method is particularly common for Greek organizations and special living options, and while it is effective for recruitment, it often misses first-generation college students, international students, and non-traditional students with few connections at the institution (Rodriguez & Kim, 2018).

2.2 Curricular HILE Programs

Curricular HILE programs are defined here as student academic programs that are tied to course credit. Programs that are not required for graduation and therefore need to stimulate student interest include study abroad and study away programs, embedded travel programs, minors, undergraduate research, and institution-mediated internships. Most institutions have an education abroad office that oversees study abroad programs and recruits students into these programs. They pique student interest by visiting classes and hosting orientations. While this method is effective at recruiting students, a student must have enough initial interest to attend an orientation.

An avenue used by many curricular HILE programs to recruit students is the first-year seminar. The core mission

of first-year seminars is to smooth students' transition into college while educating them on their responsibilities as students and the resources available to them at the institution. In addition to inviting education abroad staff to host orientations, professors for these courses often invite guest lectures by students and faculty about their research thrusts and engagement projects. Professors of first-year seminars may even proactively stimulate student interest in a variety of programs by having his or her students plan out how to incorporate HILEs into their four years of college. While first-year seminars improve students' knowledge of HILE programs in their first or second semester, their power to motivate students to pursue these programs often does not persist (Young & Hopp, 2017).

Another avenue often used to recruit students into curricular HILE programs is summer transition programs, i.e. programs for students entering college in the summer after high school, to facilitate the transition from high school to college. Summer transition programs are successful because their peer mentoring program helps freshmen build a bond with a peer while receiving an early awareness of HILE programs, which strengthens and develops a student's potential to engage at higher levels (Kumar & White, 2021).

2.3 Summary of Approaches

Overall, a major problem for all HILE programs is that they tend to have more participation from upperclassmen than underclassmen because students later in their undergraduate career are more likely to realize the connection between their involvement in HILE programs and obtaining employment (Lee, Carter, & Hughes, 2022). Current recruitment methods that try to counteract this by targeting students in the beginning of their undergraduate career often do not have a lasting effect. Other gaps among current approaches are that they are not effective for:

(1) students who are not intrinsically motivated to attend fairs or orientations;

(2) students who cannot attend fairs or orientations and do not spend time in student spaces due to living and/or working off-campus;

(3) students who are unaware of activities because they did not attend a first-year seminar or summer transition program with the institution; and

(4) students who lack connections at the institution and therefore will not be recruited specifically.

The audiences that the current approaches reach along with their gaps, including those just listed, are shown in Table 1. Alongside these approaches, there needs to be other approaches that get these audiences interested in, excited about, and enabled to take on HILEs. Furthermore, they must be lean and scalable to be sustainable and reach thousands of students every semester on a university budget. Two new approaches can fulfill this mission: SE and E^3.

Table 1. Current Approaches to Recruit Students into HILE Programs

Recruitment Method	Audience	Limitations
Non-curricular		
Involvement Fairs	Students seeking an opportunity	Students with a job or not intrinsically driven
Recruitment in Student Spaces	Students spending time in traditional student spaces	Returning adult students
Direct Targeting	Students connected to involved friends & family	First generation college and international students
Curricular		
Study Abroad Orientations	Students seeking a study abroad experience	Students who believe they cannot afford study abroad
First Year Seminars	Students in their first semester	Students in year 2 and beyond
Summer Transition Programs	Students who start college early	Students who cannot start college early
SE & E^3 Approach	Students who attend classes at any level	

3. The Spark Engagement (SE) Approach

The SE approach entails delivering student-centered modules around three themes of HILEs to cancelled and invited classes. Twenty-one student-centered modules were created as a demo-based marketing tool (i.e. a method of advertising something by showing its benefits through a demonstration) for students to become aware of HILEs and identify how to pursue them.

3.1 Pedagogy

The three fundamental tenets of the SE pedagogy are:

(1) Student-centered pedagogy: Modules should be student-centered and focused on active exercises. Instead of using class time for lecturing, the student-instructor face-to-face time is used for practical applications of content that require students to work together through methods such as problem-based learning and inquiry-oriented strategies (McLaughlin, et al., 2014). Using this pedagogy is critical to engage Millennial and Gen Z learners who value relevance, collaboration, and applied experiences (Lang & Crane, 2021; Roehl, Reddy, & Shannon, 2013).

(2) Delivery by expert or recent graduate: Depending on the topic, the instructor of the module should be either an expert so students and the professor can trust them on the topic or a recent graduate that students can relate to.

(3) Clear takeaways and next steps: The most important takeaway for the student goes beyond the immediate material that they are working on—the students should be excited to get more involved in HILEs, specifically in the programs presented to them at the end of their SE module and other similar programs.

3.2 Module Descriptions

The menu of student-centered modules were built around three themes: (1) sustainable development, (2) entrepreneurship, and (3) career development. The sustainable developmen, entrepreneurship, and career development themes were chosen to advance Penn State's goals of preparing its students to be informed, globally-aware, and engaged citizens and to be a key contributor to economic development and workforce growth in Pennsylvania (Penn State, 2024). The template used for the layout of the module lesson plans can be found in Appendix A. Faculty experts on the three chosen themes as well as instructional designers from Penn State's College of Education were consulted on the 21 modules. All modules were either 50 or 75 minute sessions, created with the intention of directing students towards university services and programs for HILEs.

An example module in the sustainable development theme is *Indigenous Ways of Knowing.* The learning objectives of this module are: "students will be able to justify how different cultures tackle problem-solving in a variety of ways" and "students will be able to analyze a problem through different lenses". The instructor briefly introduces themselves and the topic of the module and then shows two short and engaging videos. The first video is called Turtle Island, an indigenous name for North America, where Native American women share their thoughts on environmentalism. Following the video, the instructor leads a discussion among students on their views of environmentalism, how those views relate to and differ from the views shared in the video, and why the opinions of these women matter for sustainable development in America. The instructor then shows a video where a faculty member from the Interinstitutional Consortium for Indigenous Knowledge (ICIK) speaks about how the culture of the Ojibwe and other indigenous people is often misunderstood and misrepresented, as well as the Ojibwe's ways of knowing certain phenomena such as weather and how to find fish in a lake. The class is then divided into small groups, each tasked with coming up with different ways of solving problems such as figuring out if it will rain that day and finding the best recipe for baking cookies. They are also asked to discuss what experiences have led them to their knowledge on solving these problems. After each group reports to the rest of the class, the instructor leads a final discussion on differences between the Ojibwe's ways of knowing versus contemporary strategies and whether it is beneficial to learn other ways of solving problems. This module intends to direct students toward pursuing the Ojibwe field experience at Penn State. In order to provide clear takeaways and next steps, this module (as well as the other 20) concludes with a video about Penn State's Engaged Scholarship Initiative and a slide with websites where students can search for other HILE opportunities.

Embrace Creativity, a module in the entrepreneurship theme, has these learning objectives: "students will be able to identify their unique abilities and analyze their career prospects" and "students will be able to exercise their creativity by developing project ideas to improve their lifestyle". The instructor starts by showing a short and engaging excerpt from a TED talk called "Do Schools Kill Creativity" by Ken Robinson. The instructor then leads a discussion among the students on what they wanted to be when they were growing up and why they are on the path toward their dreams or not. After sharing some examples, students are then organized into groups to brainstorm ways to make money outside of wage payroll jobs. Following thirty minutes of discussion with the

instructor walking around to provide feedback, each group presents a two-minute business pitch of their product or service, and the class votes on the best idea. The class then discusses as a whole how they could actually get their ideas into motion at the university and what has previously stopped them. This module intends to encourage students to pursue the underutilized Entrepreneurship and Innovation minor as well as other entrepreneurial academic programs at Penn State, which are explained at the end of the class period following the Engaged Scholarship video.

For the *Build Your Personal Brand* module in the career development theme, the instructor leads students through a presentation reviewing three popular company brands and three popular personal brands and how each defines themselves. As the instructor reviews each, they ask the students about their perceptions of the brand, how they arrived at those perceptions, and if their perceptions match the aims of the company or individual. The students are then tasked to create their own personal brand using a list of questions and then a personal tagline for LinkedIn. Next, students create a thirty-second elevator pitch for themselves and practice this while networking with three other students. To conclude before the Engaged Scholarship video, the instructor has students report to the class what they believe were the effective elements of the pitches and then shows a list of the most highly rated skills by employers from the National Association of College and Employers (NACE, 2024). Modules in the career development theme are intended to direct students to the offerings of the underutilized Career Services Center. In addition to matching students with HILE programs that fit their career interests and assisting them with resumes to apply for HILEs, the Career Services Center could also help students articulate what they gained from their HILEs to potential employers.

Table 2 includes more examples of modules and the programs they intend to promote. It is important to note that while the academic programs promoted through the modules are not the only outlet for HILE exploration, they serve as a good starting point for students.

Table 2. Example Modules Leading to HILE Programs

Module Title	Module Description	HILE Program
A Day Without Dignity	Review case studies of charitable vs. enterprise organizations for the developing world.	Civic & Community Engagement Minor
Global Village Sanitation Mystery	Find the source of contamination and present a diagram of the poverty cycle.	Sustainability Leadership Minor
Sustainable Solutions	Learn about students developing ventures to solve problems related to unemployment, health care, food security, and energy in sub-Saharan Africa.	Humanitarian Engineering & Social Entrepreneurship (HESE) Program
Top 10 Strategies for a Killer Resume	Participate in a simulation of a recruiter scanning resumes and use that experience to improve your own resume.	Internship
Representation & Stereotyping Cultures	Ask other cultures how they would like to be represented in tourism.	Study Abroad
Career Fair Networking	Role-play a conversation you would have with a recruiter at the Career Fair.	Prepare for Career Fair

3.3 Logistics

SE was piloted at Penn State. A recent graduate was hired as a research assistant to integrate student-centered modules into existing classes. The research assistant's responsibilities included marketing modules to professors, managing the module booking schedule, and locating a facilitator to run each module. Professors welcomed the modules into their classes for three reasons:

(1) They wanted to fill a class period they were going to cancel due to a conference or personal reason. Providing the module as a service was a unique marketing opportunity that benefitted both the professor and Engaged Scholarship Initiative.

(2) The topic of the module dovetailed nicely with a subject they were teaching in their course. The modules complemented the professors' lectures while making students aware of HILE opportunities to apply their knowledge gained from the class outside of the classroom.

(3) The professor wanted an expert in career development skills to provide assistance for the course's professional package element. Traditionally, professors have directed their students to Penn State's Career Services Center,

but since only a fraction of the student population actually visits the Career Service Center, the Center partnered with the Engaged Scholarship team to offer their services directly to students in their classes.

The mediums used for marketing the modules to professors included listservs, networks of collaborating faculty and staff members, departmental newsletters, and individual emails to professors teaching general education courses. Since this was a new service, soliciting professors was accomplished organically. Building relationships was more important than mass emailing faculty. To manage the process of integration, a website, which contained all of the lesson plans for the modules as PDFs in a table, was created by the research assistant. After reviewing the modules offered, professors completed an online form specifying the module, date, time, and location requested. The form was automatically emailed to the research assistant, who then entered the information into a database. The research assistant was responsible for managing all interactions and bookings with professors.

3.4 Preliminary Assessment

Educational assessment experts from Penn State's Institute for Teaching Excellence (SITE) consulted with the research assistant, who developed a survey to assess the students' awareness of HILEs, interest in pursuing future HILE opportunities, enjoyment and value of the module, and their greatest takeaway. The survey, included in Appendix B, was administered to students at the completion of each module.

In one 15-week semester, 61 module sessions were delivered to existing classes, which reached approximately 1352 students. The modules in the career development theme were requested by faculty nearly twice as often as the other two categories. Out of the 1352 students, only 114 knew what Engaged Scholarship was prior to the module—often hearing about it from freshmen seminars. For all modules, at least 92% of students agreed or strongly agreed that they would recommend the module to a friend.

For the qualitative survey question about their greatest takeaway from the module, students' answers varied by theme and by academic year. Students who participated in sustainable development modules often mentioned their increased awareness of a global issue and their desire to solve it. Those who participated in entrepreneurship modules stated that they learned the importance of creativity and not being afraid of failure so they can pursue their dreams. Finally, students who participated in career modules were glad to have physical takeaways including LinkedIn tag phrases or summaries, a draft resume, or a list of companies to visit at the career fair. Table 3 includes some representative takeaways written by students in each of the four academic years in each of the three topic areas.

Table 3. Students' Qualitative Responses

Academic Standing	Module	Representative Responses
Freshman	Embrace Creativity	"I should get more involved and find a way to share my ideas."
	Representation & Stereotyping Cultures	"I should not jump into something based on assumptions. It is best to ask the people I am working with what their ideas are."
	Build Your Personal Brand	"There are a lot more opportunities for engaged learning than I realized."
Sophomore	Embrace Creativity	"Simple ideas can very realistically be worked into a post-college job."
	Representation & Stereotyping Cultures	"It is possible to do good and change the world while making a living."
	Build Your Personal Brand	"Taking what you have learned in the classroom and applying it in the real world can be a great experience and really enjoyable."
Junior	Embrace Creativity	"Hands on learning better prepares us for being more effective employees."
	Representation & Stereotyping Cultures	"I wish I knew about this as a freshman when I had time. Now my schedule is pretty much set as a junior."
	Build Your Personal Brand	"A student who is engaged in his/her work looks much better to future employers."
Senior	Embrace Creativity	"If I was not graduating in a few months, I would have been interested in the entrepreneurship program."
	Representation & Stereotyping Cultures	"When considering solutions there is no 'one size fits all' method. One must tailor their solution to the people it serves."
	Build Your Personal Brand	"The tagline really improved my pitch. I wish I had known this earlier on in my career search."

3.5 Analysis of SE

SE was originally conceptualized as a lean and scalable approach that a recent graduate could manage. This section reviews the positive outcomes of SE in practice as well as lessons learned on the issues of staffing, credibility, and financial analysis of the approach.

Despite the lack of marketing support, 80 professors requested this service over the course of the semester, with about half of them requesting career development-themed modules. This high level of interest reinforces the need and desire for such modules. Approximately 1200 students learned about Engaged Scholarship for the first time through these 61 modules, thereby increasing awareness of HILEs at the university. Additionally, responses to the qualitative question show that students understood the bigger picture of HILEs rather than just focusing on the workshop topic presented.

Recruiting facilitators to teach the modules was difficult without a proper incentive for them to do so. In an attempt to keep the approach lean, the facilitators either volunteered their time or the research assistant filled in to run the module. Programs have been successfully driven by volunteers, but there has to be intrinsic motivation within each volunteer. Since this was a pilot program, it was a challenge to recruit volunteers. While a lack of marketing support for the SE approach existed, even if more faculty scheduled workshops, one research assistant did not have the capacity to fill the need, nor was it the most cost-effective use of their time.

Finding credible facilitators to run these modules was a challenge because professors do not feel comfortable allowing an unknown person to come into their class, especially if they are not present. It takes a lively person with both topic-specific knowledge and public speaking experience to go into a class and get students excited about becoming engaged. Since there was a wide array of topics, it is unfair to assume that one person could be an expert in all of these areas. For this method to work, the pool of facilitators would need to be a diverse, well-trained group.

The modules engaged students in an active discussion, but more importantly, were meant to make students aware of the importance of HILEs, what opportunities were available, and how they could integrate the skills learned from an HILE into a professional experience. Although there are many ways to spread awareness of initiatives, the economic strategy is a critical aspect to reaching the largest number of students with the least amount of university funding. The SE approach paid one recent graduate $30,000 for the year to be the research assistant that curated, marketed, managed, and ran these modules—breaking down to approximately $15 per hour assuming a forty-hour work week. Each class the research assistant visited cost the research assistant approximately ten hours between designing the modules, recruiting professors, scheduling and meeting with the professor beforehand to build trust and tailor the module to their class, preparing to deliver the module, traveling to and from the classroom, delivering the module, and entering the survey data. Therefore, each module delivered cost the university approximately $150, making the actual cost of SE more expensive than originally planned.

3.6 Best Practices and Future Plans for SE

In order for the SE approach to be more successful, there must be a stronger pool of facilitators. The staffing, credibility, and financial issues could all be addressed if a well-trained student organization was established. The student-to-student engagement model, similar to summer transition peer-mentoring programs, has proven effective. A large group of students would have to be trained, but the research assistant could more efficiently manage SE in this way, rather than conducting most modules alone. Financially, a student organization is a better option because these students would be intrinsically motivated to share their HILEs and could be formally recognized such as through a certificate or ceremony. Identifying qualified students and ones that are capable of engaging a group could be the first step in improving the SE approach.

4. The Enlighten, Engage, Emerge (E³) Approach

The E³ approach entails embedding PowerPoint slides into courses that show vignettes of HILEs that are directly related to the course material. Twenty slides showing a total of 60 HILEs (internships, study abroad programs, undergraduate research opportunities, jobs, and capstone courses) are given to each professor who provides a syllabus to the E³ team and integrates the slides into their course in whatever way they choose.

4.1 Genesis

E³ emerged organically from working with faculty members who wanted to include an engagement component in their courses but had little to no flexibility with their course content. This was often the case with general education courses containing hundreds of students and a large number of course objectives to achieve in one semester. E³ was created to stimulate student interest in HILEs within these courses.

4.2 Logistics

In a Spring semester, E^3 was piloted in three courses at Penn State's main campus with a total of 2000 students. Due to the positive feedback from professors of these courses, the approach was expanded for the following semester. In the following Fall semester, a team of two payroll students and two staff members (henceforth referred to as the E^3 team) created slides for 17 courses taught by 51 faculty members with a total of 8000 students.

To set up courses, the E^3 team recruited faculty members via university listservs and personal networks and requested a syllabus for their courses with key course topics designated. The E^3 team identified 15 to 20 key topics per course and then three related HILEs per topic. The selected HILEs were intentionally spread across disciplines to attract students from various majors enrolled in the course as well as to encourage cross-disciplinary exploration. Additionally, the experiences were diversified in types of HILEs (internship vs. education abroad vs. undergraduate research), and where possible, they were biased toward addressing societal and global issues.

To represent each opportunity, the E^3 team created PowerPoint slides with a representative picture and small explanatory paragraph, including a URL where a student could find out more. Figure 1 provides an example. Upon receiving the slides from the E^3 team, professors integrated them into their lectures.

Figure 1. Example E^3 Slide for a Chemistry Class

4.3 Preliminary Assessment

4.3.1 Limitations

Assessment of the E^3 approach proved to be challenging for two reasons:

(1) An ideal assessment strategy would entail surveying students in HILE programs and asking them where they originally heard about the program. If they replied that they saw it on a PowerPoint slide in a class, the E^3 approach would be validated. This approach would require a substantial amount of staff time to collect data from all students entering all available HILE programs. Since a major selling point of the E^3 approach is that it takes few resources, and this approach to assessment would require substantial resources, it is not practical.

(2) The next best strategy would be to ask students to self-assess the impact of the slides on their interest in pursuing a HILE and whether or not they were inspired to pursue one. However, the time it would take faculty to administer a survey to their students would nearly double the amount of time they had committed to E^3. Since the other major selling point of the approach is its limited time commitment, this type of assessment might dissuade faculty from continuing to participate and invalidate the approach.

4.3.2 Institutional Reach

The Fall semester pilot reached courses across seven colleges at the main campus and 13 additional Penn State campuses. Upon working with faculty members from Penn State's campuses, it was made clear that there needed

to be additional slides aimed at students not attending the main campus as well as online and adult learners. Thus, additional slides were created based on searches for HILEs geographically surrounding Penn State's campuses as well as virtual internships and research.

4.3.3 Faculty Feedback

Faculty feedback suggests that these slides have made it easy for them to show their students direct applications of their course material and help them find ways to take what they learn in class further, which reflects broader findings on the value of contextualized, real-world learning opportunities (Eyler, 2018). Some representative quotes include:

"Thank you so much! Lots of great real world applications for students that are very relevant to my course materials. I will send my students an email (plus a few reminders throughout the semester) recommending that they check out the opportunities in the slides."

"These slides are fantastic! Thanks so much. I'll use them on the first day of classes, will post them on the course ANGEL site, and will revisit them later in the semester as well. I'll send along an email to some of my colleagues in a moment. Wonderful work."

"Thank you! I will definitely share this in class but also with other faculty members who teach courses related to sustainability and/or engaged scholarship."

4.4 Best Practices and Future Plans for E^3

4.4.1 Level of Integration

Faculty in the pilot program integrated the slides into their lectures at various levels. Some provided the slides on the course website for students to peruse. Others showed the slides that were relevant for that day before class as students were entering the classroom to make this downtime more useful. Finally, a few professors did exciting scientific demos before showing slides to catch students' attention and then provided them with immediately relevant action steps for pursuing related HILEs. Ideally, the last case can be implemented wherever possible to get students excited about the material and then excited to follow up with it through a HILE.

4.4.2 Opportunities: Live versus Frozen in Time

For the pilot, all E^3 slides presented HILEs frozen in time, i.e. the HILE programs were described on the internet and a vignette was placed on a PowerPoint slide. By the Fall semester, some of the HILEs on the slides from the prior Spring semester were already outdated. By mid-Fall semester, the E^3 team received feedback from a few professors that some of the professors presented on slides for undergraduate research opportunities had left the university or had already accepted their undergraduate research assistants for the year. With a few extra undergraduate assistants on the E^3 team, it would be ideal to create a live system of opportunities—a few students would capture stories of students pursuing HILEs as well as locate new openings for internships, study abroad programs, and undergraduate research, and enter them into a database. For each opportunity, they would tag it with a location, time frame, and key words. Instead of providing professors with PowerPoint slides, the E^3 team could then provide them with a website where these live opportunities are curated and provide them with their own webpage where opportunities that match the key words for their course are located. This webpage would update in real time when opportunities are added to the database as they become discovered and removed as they become outdated.

4.4.3 Diversification and Expansion

In order to reach more students with E^3 slides and motivate them to explore HILEs, the E^3 team will continue to include experiences wherever possible that are low cost, paid, local, and/or virtual. The E^3 team will also work through the network of the 51 professors already involved to get more faculty members, courses, and students involved.

5. Conclusion

The SE and E^3 approaches both successfully recruited many faculty members into Penn State's Engaged Scholarship Initiative. Faculty members have expressed interest in continuing with both approaches and have provided feedback on how the approaches positively affected their students. Further, several faculty members who participated in the Spring semester have become involved in Engaged Scholarship at higher levels, not only serving as a pipeline to HILEs but also providing direct opportunities for students to get involved right in their classrooms. At the very least, thousands more students at Penn State now know about HILEs and have been exposed to many avenues they can go on to pursue.

The fundamental limitation of the SE pilot was that paying one research assistant to create, market, and lead these modules with limited support cost too much to justify the outcomes. The most compelling modules will be archived and this method revisited with a student organization running the modules. Students engaging students would be more intrinsically motivating, and locating students with personal experiences around the topic would solve the credential problem. This will allow SE to have a proper return on investment.

The E^3 approach was leaner but more rigorous; short-term and long-term assessment is needed to determine the actual impact on students over time. There are steep challenges for conducting this assessment, but further institutional commitment could provide the infrastructure required. Matching the experiences presented to them throughout the course of a semester with their course material is a great incentive for faculty to participate. In geographically dispersed areas such as commonwealth campuses, institutions may need people to locate opportunities closer in proximity and hence more feasible for students to pursue in areas away from the main campus.

Penn State will address the limitations and challenges of both approaches, and the results will be shared as they are tested in the future. In the end, SE and E^3 are just two layers of what Penn State is doing to scale Engaged Scholarship. Spreading awareness and engaging students using a variety of approaches is what will get increasingly more faculty and students involved to make sure every student graduates with a HILE.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendix

Appendix A: Spark Engagement Module Template

Title		
NUMBER	*ES Staff will assign a number.*	
TIME	*50/75 Minute*	
THEME	*Overall theme of module*	
LEARNING OBJECTIVES	1	*Students will be able to…*
	2	
	3	
PROCEDURES **Activity 1:** Whole Class/Small Groups (time in minutes) **Activity 2:** Whole Class/Small Groups (time in minutes) **Activity 3:** Whole Class/Small Groups (time in minutes) Show Engaged Scholarship video (6:00) which defines what ES is and gives examples. Show Resources for Finding Engaged Scholarship Opportunities. Hand out Adventure Assessment, students complete, and collect.		
MATERIALS	*Link to Google Doc for any handouts or PowerPoints*	
ADDITIONAL RESOURCES	*Future exploration links relevant to module*	
ACKNOWLEDGEMENT	*Name/title of expert or link to website curated from.*	

Appendix B: Spark Engagement Survey

Academic Year: _____

Engaged Scholarship refers to engaging in out-of-class academic activities, such as participating in undergraduate research, community-based learning, internships, studying abroad etc.

1) Did you know about Engaged Scholarship prior to today's class? (Please circle)

Yes   or   No   If yes, where did you hear about it? _____

2) I would recommend today's class session to a friend. (Please circle)

Strongly Agree   Agree   Disagree   Strongly Disagree

3) Which Engaged Scholarship Program would you participate in? (Please check)

Undergraduate Research	
Study Abroad	
Service Learning	
Internships	

4) What is your takeaway from today's activity? (Aha Moment!)