Using Quests and Events to Promote Agency and Holistic Development

Dr. Stu Thompson, Bucknell University

Stu is an associate professor and chair of the department of Electrical and Computer Engineering at Bucknell University, in Lewisburg, PA. While his teaching responsibilities typically include digital design, computer-related electives, and senior design, his focus has shifted more and more towards engineering education.

Dr. Rebecca Thomas, Bucknell University

Rebecca Thomas is the inaugural director for the Pathways Program at Bucknell University, where she oversees the rollout of Bucknell's ePortfolio initiative. She is also a Associate Teaching Professor in the Department of Electrical and Computer Engineering. She holds a B.S. and M.Eng. in Electrical Engineering from the University of Louisville and a Ph.D. in Electrical Engineering from North Carolina State University.

Michael W. Beach, Bucknell University
Dr. Alan Cheville, Bucknell University

Alan Cheville studied optoelectronics and ultrafast optics at Rice University, followed by 14 years as a faculty member at Oklahoma State University working on terahertz frequencies and engineering education. While at Oklahoma State, he developed courses

Sarah Appelhans, Lafayette College

Sarah Appelhans is an Assistant Professor of Engineering Studies at Lafayette College. She earned her PhD in Cultural Anthropology at the University at Albany (SUNY) where she conducted research on the cultural factors that contribute to inequalities in engineering. As a postdoc at Bucknell University, she was the resident ethnographer in the Electrical and Computer Engineering Department, exploring applications of Amartya Sen's capabilities approach in engineering education. Her current book project, On the Bleeding Edge: Gender, Immigration and Precarity in Semiconductor Engineering, investigates the intersections of gender, race/ethnicity, and immigration status among semiconductor engineers.

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Abstract

This full paper in the evidence-based practice track is the second in a five-year longitudinal study that examines the design of an experimental course to promote student agency and holistic learning within an electrical and computer engineering (ECE) program. The course supports student exploration in areas related to their engineering and other academic related interests. This paper examines the first offering of the course in spring 2025 to first year ECE students and builds upon a previous study describing how the course was prototyped and co-developed by faculty and students. In this paper, we explore the following research questions: 1) What events and quests did students choose? 2) How did students perceive the value of the activities they pursued? 3) How did the course structure impact the development of student agency and holistic learning?

The course features three primary aspects: discussing the book *Designing Your Life*, attending "events" selected based on interests, and completing short-term "quests" of their choosing which result in a deliverable to show development or achievement. Student learning experiences were measured by guided reflections in an ePortfolio and an end-of-semester survey that asked about the value students placed on these activities and other aspects of the course. Analysis of these sources was performed to understand how the students exercised their agency to develop in ways supportive of becoming an engineer and how they valued the various aspects of the course. The analysis of the first semester provides insight into how students utilize autonomy to develop holistically and will inform adjustments to the course contents and course structures.

Results indicate the course approach aligned with student interest and students pursued a variety of opportunities. Major course components received generally positive feedback and several students noted ways they had grown holistically. Overall, the course is achieving its initial goals, though the data also highlighted areas of improvement. Some students desire more choice in quest selection, some reported challenges with time management, and some found only parts of the course valuable. While most students found something meaningful in the course, additional work is needed to understand the perspectives of those who did not and to adapt the course to better fit their interests.

Introduction

Agency and holistic thinking are recognized as important skills for engineering students especially as modern engineering problems are more complex, interdisciplinary, and socially embedded. Agency is broadly defined as the will and capacity to act [1]. Bandura's social cognitive theory frames agency as arising from interpersonal, behavioral, and environmental factors [2], [3] and includes both observable actions and underlying beliefs. Agentic behaviors can be exercised through participation and action or through intentional non-participation or restraint, and a sense of agency develops when individuals are provided with meaningful opportunities to make choices [1], [4]. In engineering education, agency can be understood using multiple themes including student learning, persistence and positioning [5].

Holistic thinking is the ability to integrate multiple perspectives and contexts when addressing complex problems. Both agency and holistic thinking support the development of self-authorship, defined as *"the ability to internally define one's beliefs, values, identity, and social relations"* [6, p. 53]. Together agency, holistic thinking, and self-authorship highlight the importance of providing students with opportunities for choice, reflection, and connection across contexts.

Higher education does not typically place a strong emphasis on these essential capacities. Engineering curricula, in particular, may hinder student agency through rigid assignment structures that limit students' abilities to take ownership of their work [7] and normative expectations that influence students' pathways and identity development [8]. Because student development happens continuously through their chosen experiences, our initial efforts show that developing agency and holistic thinking requires integration across multiple courses over time. In response, we are developing a program-length experience that students enroll in nearly every semester. This structure supports students' exploration of interests connected to their engineering studies as well as broader academic and professional goals.

This paper is part of a longer longitudinal study examining the design, implementation, and integration of the intervention within the required electrical and computer engineering (ECE) curriculum. Building on the pilot study described in the first paper of this series [9], this paper focuses on the first offering of the multi-semester intervention in Spring 2025. A cohort of 33 first-year electrical and computer engineering majors enrolled as part of their degree requirements. While the course is intended to eventually include all students within the degree program, implementation began with first-year students and will scale to additional cohorts over time.

As developing agency is a central goal of the intervention, it shaped the design of this first semester offering. Students were required to read and discuss a book, but were granted significant autonomy in two major components of the course: attending campus events and completing personal quests. Students exercised agency by selecting activities and events and reflecting on their choices to make meaning in relation to their developing identities and interests. To evaluate the effectiveness of this first offering and guide future iterations of the course, we address the following research questions:

1. What events and quests did students choose?
2. How did students perceive the value of the activities they pursued?
3. How did the course structure impact the development of student agency and holistic learning?

Course and Participant Information

The study took place at a liberal arts university with nearly 4,000 students and approximately 100 students in the ECE department. As a curricular requirement, students enroll in this course every semester of the degree program, excluding their first semester on campus. Completion of the course sequence yields one course credit, equivalent to one quarter of a typical course workload, or approximately 40 hours of engagement per year based on university guidelines. The

first offering of the course in Spring 2025 included 33 first-year electrical and computer engineering majors. Since first-year students only take the course for a single semester, this initial offering was designed for approximately a 40-hour workload and a structured, scaffolded format appropriate for students new to college-level courses with less predefined structure.

The course syllabus, as given to students, includes three primary goals:

1. Create time, space, and support to integrate and align your learning across classes, activities, and personal experiences.
2. Provide opportunities for you to explore your interests and values and connect them with your engineering interests.
3. Create a collaborative community where you can build connections, contribute, and receive support.

Grades were determined using a point-based system (maximum of 45 possible points; 37 points required for an A). Points were earned for four course components:

1. Class attendance and participation (14 points max): Students earned one point per week during the 14-week semester for attendance and participation during in-person class meetings.
2. Reading and book reflections (12 points max): Students completed six assignments (2 points each) based on the first half of *Designing Your Life* by Bill Burnett and Dave Evans [10]. Rooted in design thinking, this book encourages agency by positioning students as active designers of their paths rather than passive decision makers. It also supports the development of self-authorship encouraging students to articulate values, beliefs, and future plans.
3. Attending campus events (5 points max): Students could earn points for attending up to five approved events, such as Engineering Week (E-week) activities, talks from the national speaker series, or student presentations, accompanied by brief ePortfolio reflections.
4. Quests (14 points max): Students pursued self-selected activities from a predefined menu or could propose their own. Options were categorized as disciplinary exploration (learning about engineering as a field), professional exploration (career development), technical skills (hands-on makerspace activities), and academic support (study groups or tutoring). Six suggested quests were included in the schedule, with additional quests or end-of-semester presentations optional to maximize points.

ePortfolios with artifacts and written reflections captured student engagement in book assignments, campus events, and quests. Students voluntarily completed an end-of-semester course survey. Demographic data were self-reported from the 30 survey respondents. Eleven students identified as electrical engineering majors and 19 as computer engineering majors, with 4 computer engineering students pursuing additional majors outside of engineering. Participants included 5 females, 24 males and 1 student who chose not to disclose their sex. Regarding participant demographics, 16 students described their race or ethnicity as White, 4 as Black or African, 4 as Hispanic or Latino, 3 as Asian, 2 as Middle Eastern or North African, 1 as Eastern European and 1 student preferred not to respond.

This study analyzes how students enacted agency, which course components they found valuable, and the impacts of the course structure. ePortfolio artifacts, reflections, and survey

responses provide insight into how students exercised agency, made meaningful choices, and the extent to which this offering met its intended outcomes.

Methods

Two sources of data are analyzed. The first dataset is the end-of-semester survey administered voluntarily on the last day of class. Thirty students completed the survey but not all students responded to every question. Because one response only provided demographic data, most questions have 29 responses (n = 29). The second dataset consisted of guided ePortfolio reflections associated with the events that students attended, which 28 students completed (n = 28). The overlap between the survey participants and the students who submitted events is substantial but not identical.

The survey contained both quantitative and qualitative questions. In the quantitative section, students reported their interest and engagement in predefined quest options by selecting one of four responses: 1) completed and found it valuable, 2) completed but did not find it valuable, 3) interested but did not complete it during the semester, or 4) not interested. Students were also asked to identify the quest that they found most valuable. These quantitative survey items were analyzed descriptively, including calculating frequencies and proportions for each response option.

The survey also included open-ended questions asking students to reflect on their experiences in the course and the ways in which different components supported or did not support their learning. Responses were systematically coded using a deductive approach to identify meaningful categories. We counted the frequency of each code and classified the sentiment of each comment as positive or negative in relation to the students' learning experience. Representative quotes are included to provide examples and contextualize the results. The list of open-ended questions analyzed in this study is provided below.

- *Describe how the book, and the different activities (events, quests, personal explorations, etc) contributed to your learning. If they did not, then describe how they fell short of supporting you in your learning and what could have been more helpful.*
- *This course provides you with different opportunities to explore your own interests, as they connect to ECE and Bucknell. Describe an opportunity that you took advantage of and how you explored that opportunity.*
- *What additional opportunities would you need to better explore your learning and interests?*
- *What, if any, barriers did you encounter that hindered your learning? Briefly describe them.*
- *Describe a moment where your understanding of yourself changed in this course.*
- *What advice would you give to improve this course? Describe one change you'd suggest for future offerings.*

The event reflections were analyzed using deductive coding to categorize events by type. We recorded the frequency of each event type to examine patterns of participation and preferences.

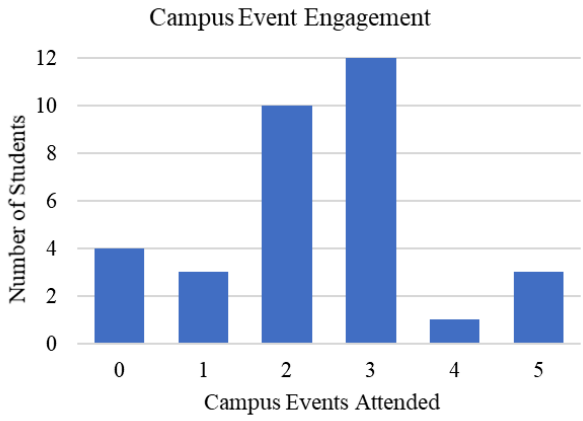
Results

Campus events and quests are the focus of our first two research questions because they represent the primary mechanisms through which we could observe students' agentic action in the course. Results for these components are presented by first describing what students chose to engage with and then examining the perceived value of those choices.

Campus Event Participation and Value

The course schedule included suggested completion dates for two events, but students could earn course credit for attending up to five events during the semester. Student engagement with events varied, with individuals completing between 0 and 5 events. On average, students attended just under 3 events. A histogram of the number of events attended is shown in Figure 1.

Reflections on each campus event were documented in course ePortfolios and served as the primary data source for analyzing event participation. Students also commented on campus events in response to the open-ended survey questions. These responses provide additional evidence through code frequency and representative quotes.



Event Type	Percentage
E-week	18.2%
University sponsored speaker	15.6%
Observing peers work	15.6%
Cultural event	10.4%
Career Development	10.4%
Talks sponsored by a department or career center	10.4%
Build Department Community	6.5%
University trip	5.2%
Other	7.8%

Figure 1: Campus events attended during the semester, derived from ePortfolio event reflections.

Analysis of the ePortfolio reflections indicates that students engaged with a wide range of campus events. Deductive coding identified 9 different event types demonstrating that students exercised their agency in multiple ways such as participation in community-building activities, cultural events, and events highlighting peer work. The frequency of event type is shown in Figure 1.

More than half of the students attended at least one event beyond the two recommended by the course structure. In the open-ended survey results, events were coded 24 times, with 21 positive sentiments and three negative sentiments. Positive comments described events as “interesting,” “valuable,” “really open.” and “helpful.” Negative comments characterized events as an “obstacle,” requiring “a lot of foresight,” and as difficult to fit into students’ schedules. Several students expressed more nuanced views, noting that while events are things that students ought to be engaged with, they were unsure whether they should contribute towards a course grade.

One student suggested that additional structure providing clearer expectations would be helpful. The following excerpts illustrate positive student perceptions of campus events:

> *"The events helped [me] be able to interact and connect with the upperclassmen as well as put myself out there a lot more than I would have."*
>
> *"I think that the events and the book contributed to my learning. The events were a way for me to meet more people and learn new things."*

Quest Engagement and Preferences

Students were expected to complete six to seven quests to earn an A in the course. The number of quests completed by individual students ranged from one to eight, with an average of 5.9 quests and a median of 6. Students selected from a predefined set of nearly 20 quest options, listed in Table 1. Students added a new page to their ePortfolio for each quest where they reflected on the experience and their learning. Students were required to include at least one artifact and answer the following prompts: *What did you do? What did you learn? What new insights or questions do you have? What setbacks did you encounter? How did you overcome any setbacks? How did this quest impact you? How will you use what you've learned in the future?* In the quantitative section of the end-of-semester survey, students provided feedback on their engagement with and interest in the majority of explored quest options. Table 1 summarizes students' self-reported engagement with each quest, including the number of students who completed each option, whether those students found it valuable, and the level of interest among students who did not complete it.

The data show variation in participation across quest types with some level of interest in all of the options. While some quests were completed more frequently than others, every quest generated some level of interest among students who had not yet attempted it, and none were rated as entirely uninteresting by the class. The most frequently completed quest was the article reflection with 24 out of the 29 students who responded to this question (approximately 83%) reporting completion. The most common type of quest pursued involved developing technical skills including laser cutting, completing a LinkedIn Learning course, or completing other makerspace projects. In contrast, quests focused on academic support and exploration were completed by fewer students, with only 8 of the 29 respondents reporting participation in these options. Across all completed quests, students reported finding value in 88.3% of their experiences.

Students showed interest in many quests they didn't complete during the semester. Although relatively few students completed the quests related to soldering, interviewing an engineer, and attending a resume workshop, most students indicated interest in these options. Quests focused on academic support and LinkedIn Learning courses generated the least interest.

We also explored quest data at the individual student level to see how each student made choices and perceived value. Of the 29 respondents, 19 indicated that *all* of their completed quests were valuable. Of the remaining 10 students, eight reported that at least half of their quests were valuable, while two reported minimal value across their quests. Students who reported lower perceived value also tended to list more quests in the "not interested" category.

Table 1: Self-reported completion, value, interest and most valued rankings for available quests (end of semester survey)

Quest	Completed	Valued	Interested	Not Interested	Most Valued Rankings
Article Reflection	24	19	3	2	2
Attending the university job fair	17	14	10	2	6
Laser Cutting something for a project	16	15	8	5	2
Completing a LinkedIn Learning Course	10	9	8	11	1
Other Maker-E projects	9	9	17	3	0
Developing Your 3D printing skills	8	7	20	1	1
Seeking Academic Success support	8	8	7	14	1
LinkedIn Profile Review with CCA	6	5	14	9	1
Practicing soldering by populating the “B”	6	5	18	5	2
Interviewing a practicing engineer	5	5	19	5	6
Attending a resume workshop	3	3	21	5	0

The end-of-semester survey asked students to identify their most valued quest and explain why. Coded responses are summarized in the last column of Table 1. Attending the university career fair was frequently identified reflecting both high participation and perceived value. All five students who completed an interview with a practicing engineer identified it as their most valued quest. Several students also identified quests focused on developing technical skills such as laser cutting, 3D printing, or soldering.

Qualitative responses further show how student interests were distributed across the various quest types:

> *“The interview was most valuable, as I got real life perspectives from someone who’s shoes I hope to be in one day.”*
> *“Laser cutting was useful because it helped me be able to involve myself and make my own projects when I have time to do so. It allows me to take charge of my own creativity.”*
> *“I found my meeting with the career office the most valuable because it helped me polish my resume and find a summer job.”*

In the six analyzed open-ended survey questions related to the course structure, quests were coded 28 times. Nineteen of these mentions were positive with over half occurring in responses to the prompt asking students to describe an opportunity they had taken. Positive comments generally described quests as helpful and providing opportunities to explore. Nine negative responses were also coded, six related to limitations in the quest options and three to the time required. The full results from this analysis are shown in Table 2. Negative comments included

statements such as quests being “too shallow” or feeling “like a chore.” A few students expressed a preference for completing fewer but larger quests. Students also differed in opinions about quest focus: some wanted quests less focused on ECE and engineering topics, another suggested focusing only on professional skills, while one preferred a technical skills focus. A few representative quotes regarding quests follow:

> *“I think the [quests] were a good way to see different parts of the field, and as an excuse to attempt projects that might not find a place in the classroom.”*
> *“I really like having the opportunity to work on projects, and I wish that I could dedicate my time to the big projects that I haven't had enough time to work on much this semester.”*
> *“And the [quests] helped search for an interest to focus on later on and explore my own interest.”*

Perceptions of Course Structure

Table 2 summarizes the qualitative coding of open-ended survey responses, examining whether students viewed course elements positively or negatively. Less frequently coded themes (occurring fewer than 10 times) included complaints regarding the ePortfolio platform, general course structure, and time management.

Table 2: Open-ended survey responses coded by positive and negative sentiments

Course Aspects	Positive	Negative
Events	21	3
Holistic Development	21	3
Quests	19	9
Prof. Skills Development	14	1
Book reading	11	10
In-class Activities	10	6
Motivation	5	5

Students frequently reflected on how the course supported their holistic development. Many mentioned connections between the course and their other interests or personal growth:

> *“They helped me reflect on my identity and purpose.”*
> *“It made learning more personal and made me consider, not just what, I was learning.”*

While many students valued the holistic approach, a few expressed a strong preference for strict technical skill development:

> *“The activities could have been more helpful by revolving around teaching only technical skills and not life skills”*

Students expressed mixed reactions to the day-to-day structure of the course and the in-class activities. Some wanted a more curated experience focused on technical or professional topics, while others suggested more time for self-exploration and broader learning:

> *“... but I would also like to hear the non-technical parts of being an engineer, what it’s really like. What I can expect and prepare for once I leave school. It was there, but I think it needs to be central.”*

"... but having more speakers or time to talk about bettering ourselves would make it more worthwhile."

Multiple students commented negatively on the constrained set of quest options, suggesting these be removed to allow students to pursue a wider variety of quests:

"Could have a couple assignments less focused on engineering itself and rather on how we can express ourselves"

"Less but more focused individual explorations, more embracement of other subjects not directly related to ECE."

The ePortfolio platform, Digication, was mentioned 7 times by 5 students as an obstacle to learning and agency:

"Digication is not easy or intuitive to use and doesn't help at all with my learning. I also had to hunt for every deadline."

"I didn't like the way the assignments were set up. I found igitation hard to use."

Time management and competing priorities also challenged some students, either due to scheduling conflicts or individual executive functioning:

"Attending events required a lot of foresight"

Discussion

The data suggest that students found value in the campus event component of the course. The most common event category was E-week events. National Engineers Week occurs each spring semester and is observed by our university through a friendly competition between engineering departments. Multiple opportunities for participation are included such as a banner design competition, E-week videos, and a culminating celebratory dinner which likely contributed to higher engagement in this category. Students pursued a variety of campus events and quests, rather than converging on a small subset of options. This diversity of engagement suggests that students exercised agency and explored engineering and the university in ways that were personally meaningful.

While most students found quests valuable, a small subset did not. This suggests that available quest options may not have aligned with individual interests or that the idea of a "quest" did not resonate with all students. The course structure allowed students to propose their own quests, but none did so during this offering, suggesting this option needs to be more visible and better supported. However, this interest in expanding or personalizing quest options can be seen as a positive signal of student agency and motivation.

Initial concerns that some students might reject the non-traditional, holistic (i.e., not purely technical) lens of the course were not reflected in the data. Rather, students engaged with a wide variety of campus events and quests, and most reported these experiences as positive and valuable. Comments related to motivation further highlight a productive tension in the course design. Some course elements shift activities that might otherwise be intrinsically motivated into a graded context, but this structure may help students prioritize exploration while managing a demanding academic schedule. Although we hope students are developing habits of continual

learning and exploration, the course leverages the reality that required and graded work often takes precedence.

The course appears to have promoted agency for some students, but structural elements presented challenges for others. Students also identified time management and competing demands as barriers to engagement. Although course deadlines were intentionally more flexible than in many other courses, this flexibility sometimes led to procrastination, increased stress, and reduced ability to choose options fully aligned with personal interest and value. These findings highlight the need to better support first-year students in developing time management skills while continuing to balance structure and agency in the course.

This specific course structure was designed for a first-year cohort of students, but the underlying mechanisms are transferable to other engineering programs. Even without a standalone course, these course components and reflections could be integrated as modular assignments within existing first-year courses or other engineering courses. The findings demonstrate that pairing student choice and guided reflection can promote agency and holistic development in engineering curricula.

Conclusions, Limitations, and Future Work

The findings from this study suggest that the overall course approach shows promise in supporting student agency and holistic development when provided with structured autonomy. By allowing students to choose campus events and quests, students were able to connect these activities with personal and professional interests. In this initial offering, students valued the core course components including campus events and quests.

This study has several limitations. The sample size is small and drawn from a single department at one institution. Additionally, the end-of-semester survey instrument was not validated, and results rely on self-reported data. There is also potential for response bias, self-selection bias, and the influence of grading on student responses.These factors suggest the need for caution in interpreting the findings.

Despite these limitations, we have demonstrated a foundation for supporting student agency in an engineering curriculum. The insights from this study are informing adjustments to subsequent course offerings. Although students generally viewed quests positively and the predefined quest list aligned with the interests of most students, survey responses indicate a desire for greater flexibility. How students' agency and holistic learning continue to evolve across multiple semesters will be examined throughout this five-year longitudinal study.

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