

Why Don't Commuter-school Students Pursue Start-ups?

Dr. David G. Novick, University of Texas, El Paso

David G. Novick, Mike Loya Distinguished Chair in Engineering and Professor of Engineering Education and Leadership, earned his J.D. at Harvard University in 1977 and his Ph.D. in Computer and Information Science at the University of Oregon in 1988. Before coming to UTEP he was on the faculty of the Department of Computer Science and Engineering at the Oregon Graduate Institute and then Director of Research at the European Institute of Cognitive Sciences and Engineering. At UTEP he has served in a number of positions including as Chair of the Department of Computer Science, Associate Provost, Associate Dean of Engineering for Graduate Studies and Research, and co-director of the Mike Loya Center for Innovation and Commerce. His research focuses on interactive systems, especially human interaction with intelligent virtual agents, and on interaction in support of innovation. He served as General Co-chair of the ACM Conference on Universal Usability 2000, Program Chair of ACM SIG-DOC 2003 and General Chair of ACM SIG-DOC 2007, and organized SIGCHI's series of events in Natural Language Interfaces. He has authored or co-authored over 120 refereed publications and over \$16 million in funded grant proposals.

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Abstract

This paper reports the results of an empirical study of why student teams at commuter schools, particularly with underrepresented populations, do not pursue their course projects as startups. The study was conducted at a large public university at which 98% of undergraduate students commute to school, 84% are employed, and 80% are Hispanic-American. Interviews were conducted with 16 students in an engineering major, a participation rate of 47% of the subject pool. The interviews covered the students' reasons for pursuing or not pursuing their course project after the conclusion of the course, reflection on factors that would encourage or discourage students from pursuing their projects, and employment status during and after the course. The results of the interviews were assessed through thematic content analysis. The interviews suggest that (1) that students do not continue with their projects because they cannot take time away from the paying jobs that are supporting their education, (2) that students completing their junior year do not want to take time away from their senior-year studies, and (3) that students completing their senior year do not want to take the risk of pursuing a startup when they could instead obtain a "real" job. Additionally, student startups appear to have been discouraged by their expectation in the courses, by the composition of the project teams, by lack of passion for their projects, and by uncertainty about the path forward.

1. Introduction

Over the span of two years of courses devoted to innovation and entrepreneurship at a major university, and despite strong encouragement, not one of the 17 project teams launched its innovation as a startup. This R1 university has students who are overwhelmingly commuters and are majority Mexican-American. Based on interviews with members of the project teams, this paper explores reasons for this outcome and suggests policies and programs that might encourage greater participation in startups at commuter universities with minority student populations.

For students at residential colleges, the path to commercialization is relatively clear. The three-stage Student Entrepreneurship Encouragement Model (SEEM) [1] stands as a leading account of how to help students progress from idea to startup. This model works well at universities where it was developed. For example, in 2017 at MIT 21 student startups completed the Delta V accelerator program, and 18 of these presented at the Delta V demo day [2]. But this model does not appear to work as well at commuter colleges and universities, especially for urban minority-serving institutions, which have a student population that comes from relatively low-income backgrounds. Reports [3] indicate that nearly all undergraduates at these schools work at least part-time while enrolled and that most students have little time for extracurricular activities. Despite their best efforts, these schools' I&E programs can fall short on providing the high level of engagement needed to launch students on the entrepreneurial path. As a result, student project groups tend not to progress into startups despite having opportunities such as NSF I-Corps and VentureWell e-teams programs. Anecdotal evidence suggests that these students progress through the *educate* and *stimulate* stages of the SEEM model, but they fail to progress through the *incubate* stage.

This paper reports the results of an empirical study of the reasons for the commuter-school student teams' not continuing their projects. The study's principal hypothesis is that

- (1) Students do not continue with their projects because they cannot take time away from the paying jobs that are supporting their education.

Other possible factors affecting the choices of students could include

- (2) Students completing their junior year do not want to take time away from their senior-year studies, including their capstone project, and
- (3) Students completing their senior year do not want to take the risk of pursuing a startup when they could instead obtain a "real" job.

And other factors, certainly, may play a role, too. For example, it is possible that that the students' projects, while worthwhile, were not at a level of significance that students felt justified further effort. The university may not have provided all the elements of the *incubate* stage of the SEEM model. Or students may have received inadequate mentoring (cf. [4]).

To explore these issues, interviews were conducted with engineering students who completed courses in innovation, design, and entrepreneurship in which teams proposed new startups.

2. Methodology

This study was conducted at a large public university in which, of undergraduate students, 98% commute to school, 84% are employed, and 80% are Hispanic-American. An additional 4% are Mexican nationals. The study's participant pool reflected these demographics.

The participant pool for this study comprised the 34 students in a particular engineering major who in the last two years had (a) completed the junior-level sequence of engineering and entrepreneurship, which is effectively a nine-month I-Corps program for undergraduates [5] or (b) completed a course in innovation in technology, in which students developed ideas for potential startups.

Junior-level sequence. The two courses in the junior-level sequence were Engineering Design: People to Products and Engineering Entrepreneurship: Products to People. This was a required course sequence for majors. The course had students develop potential startups, using Lean Launchpad [7], the NSF I-Corps methodology [8], and the Innovation Canvas [9]. The entire second semester involved refining the design and developing the "Market" quadrant of the Innovation Canvas, which is equivalent to the business model canvas, for a single startup project per team of three to five students. The second-semester course concludes with presentation of the proposed startups to a panel of experts in technology, innovation, and entrepreneurship. The instructors, who team-taught the course, encouraged each team to pursue its project as a startup, suggesting paths through local incubators, presentations at 1 Million Cups of Coffee [10], and participation in venture competitions. One team did present its startup at 1 Million Cups of

Coffee and received both enthusiastic comments and offers of assistance. The team did not take up these offers, however.

Innovation in Technology. This course was offered as an upper-division elective for students in the College of Engineering and in the College of Liberal Arts, through cross-listing between the Department of Engineering Education and Leadership and the Department of Communications. The course, which has been offered for five years, develops design skills for advanced students in engineering and computer science, building on the students' technical knowledge to help them identify and find novel solutions for difficult design problems. To do this, the course enables students to improve their innovation skills and to understand the role of innovation in technology-based enterprises. Working with innovation techniques, including Liberating Structures, as a central theme, the course integrates improvisation and story-telling to build creativity. Students apply these techniques to develop mobile applications, and, more broadly, ideas for technology-based business and public-sector start-ups. Students also develop perspective on how design affects translation to commerce or other use. The course concludes with presentation of the proposed startups to a panel of experts in technology, innovation, and entrepreneurship.

The study recruited its participants via email; some students had graduated and had email accounts that were possibly no longer accessed by them. From the total subject pool, 16 students participated, for a participation rate of 47%. Fourteen of the interviews were conducted in person, and three were conducted over the telephone. The interviews were conducted over the span of about six weeks and lasted between 15 and 25 minutes each. Of the 16 students interviewed, all had completed the junior-level sequence and 12 had completed the innovation course.

The interviews covered:

1. The students' experience in the courses,
2. Description of and attitudes toward their course project, reasons for pursuing or not pursuing their course project after the conclusion of the course,
3. Reflection on factors that would encourage or discourage students from pursuing their projects, employment status during and after the course, and
4. Reflection on the interview.

The interviews were conducted by the author, who has extensive professional experience conducting discovery interviews, as semi-structured conversations. The questions were asked in the order of the topics listed above, and follow-up questions elicited additional factors, cases, attitudes, suggestions, and reflections.

The results of the interviews were assessed through thematic content analysis [6]. Because the study was classified by the university's institutional review board as exempt, data could not be collected that from which the subjects could be identified, even by the principal investigator. Accordingly, the study does not have data on age, sex, and commuter status that would enable breaking down its results at a finer-grained level. However, it is virtually certain that all of

study's participants were commuters, as the university's residential students tend to be athletes from outside the immediate region and international graduate students.

Notes of the interviews were coded by the principal investigator for:

- Course(s) enrolled
- Employment during university enrollment,
- Factors leading students to not pursue their project as a startup, and
- Suggested measures for increasing the rate of startup formation from course projects

3. Results

The study's three hypotheses were assessed using the interviews and the coded data. On average, each of the 16 participants provided 2.2 reasons for not launching their project as a startup.

3.1. Hypothesis 1

Hypothesis 1 was that students do not continue with their projects because they cannot take time away from the paying jobs that are supporting their education. The data suggest that this is true. As shown in Fig. 1, students most frequently mentioned lack of time as a factor discouraging pursuing a startup. This lack of time is almost certainly due to their need for employment: as shown in Table 1, nearly all the students worked while enrolled. Of the working students, juniors worked from 10 to 35 hours per week, and seniors worked from 10 to 25 hours per week. Mean hours worked were over 20 hours per week as juniors and were just over 17 hours per week as seniors.

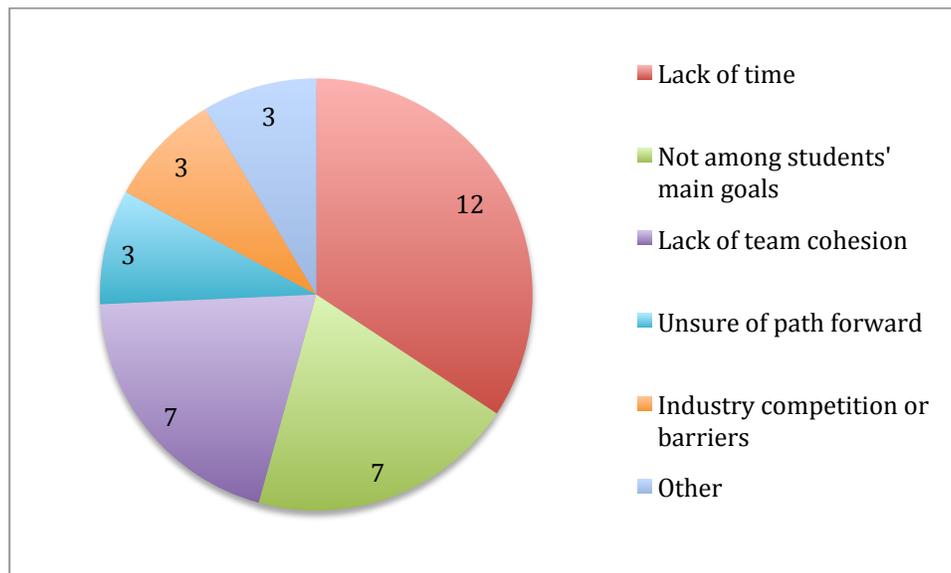


Figure 1. Factors indicated by students for not pursuing projects as startups.

Table 1. Student employment during junior and senior years.

	Junior Year	Senior Year

Working	16	14
Not working	1	3
Mean hours/week (of students working)	20.8	17.2

3.2. Hypothesis 2

Hypothesis 2 was that students completing their junior year do not want to take time away from their senior-year studies, including their capstone project. The data suggest that this is true. Interview results indicated that the decrease in number of seniors working and in the number of hours they worked, as reported in Table 1, was caused by students anticipating an increased workload as seniors, particularly for the capstone senior design sequence, which involved real projects for real clients. As a result, the decrease in employment did not free up time for pursuing startups. For example, a student reported that her top priority was school and, because she had to work, she did not have time for anything extra, especially because a startup was a big risk and would take a lot of work. Indeed, another student reported that, as a senior, he wished he could have stopped his outside job so that he could spend 40 hours a week on his team's capstone project.

The interviews also revealed another dynamic with respect to the summer following the junior-year sequence. The students' major requires two commercial or research internships, which are typically taken in the summers before and after the junior year. This meant that many, perhaps most, of the students would not be in town for the period immediately following the project. And for those students who remained at the university for the summer, the loss of teammates for the summer made pursuing their project impractical. For example, a student reported that her team actively considered participating the VentureWell e-teams program [11], but the program was in the summer, when two of the four teammates were at out-of-town internships and the remaining two teammates had not been as active in the project. Similarly, another student reported that she had an internship that took her out of town, one of her teammates was on his way to New Zealand, and another was off to a project in Puerto Rico.

3.3. Hypothesis 3

The third hypothesis was that students completing their senior year do not want to take the risk of pursuing a startup when they could instead obtain a "real" job. The data suggest that this hypothesis is also true. As shown in Figure 1, the second-most-frequent factor mentioned by students, that launching a startup was not among their main goals, related to the students being primarily focused on graduating and finding a job. The participants reasonably saw that launching a startup would take time away from the studies they needed to graduate and then obtain employment. Seven of the participants discussed this factor explicitly. One suggested that launching a startup was not in students' long-term interests, as they already have goals, especially graduating and getting job. They are looking for job security, he added. Another student said bluntly that students go to school to get a job—that's their priority. As one student put it, they're just trying to graduate.

4. Other Factors

The results of the interviews suggest that all three hypotheses are true. But the interviews also disclosed additional factors that appear to have a large impact on students' choices to launch (or more likely not to launch) a startup from their student projects. These factors include students' expectations for the course, the composition of teams, lack of passion for the project, and uncertainty about the path forward. Interestingly, some of these factors suggest a tension between (a) encouraging startups and (b) the instructors' pedagogy.

The first factor, which is a corollary of the "not among students' main goals" factor shown in Figure 1, relates to *students' expectations*. Five of the participants mentioned that students in the junior sequence and the innovation course saw these as "just a class." One participant said that his team never discussed pursuing their project as a startup because the team members were "just there for the class." Similarly, another participant said that their efforts in both the junior sequence and the innovation course were more of "just a project for a class rather than doing something for real." The junior-level sequence is required for majors, and thus students may see this more as a hurdle than as an opportunity. The courses are about entrepreneurship and entrepreneurial skills, but they do not necessarily convert students immediately into entrepreneurs.

A second factor involves the *composition of teams*, expressed in Fig. 1 as lack of team cohesion. In all of the courses studied, the team membership was assigned by the instructors. In some cases, students could deploy a "silver bullet" to avoid being on a team with a particular person, but otherwise the teams were organized by the instructors (a) to be diverse and (b) to avoid placing one woman on an otherwise all-male team. There were three associated rationales for this approach. First, the instructors wanted to avoid clubby behaviors, which could exclude some students from contributing to their potential. Second, the instructors wished to avoid isolating a woman on a team where she might lack relative power. Third, and most important, teamwork itself was a course outcome, and the instructors' goals included making sure that students had experience with team diversity and conflict. Five of the participants reported that their team had not been "in sync." Two other participants reported that their teams were split on whether to launch their project as a startup. As one participant reported, their team's dynamics started on the right path but did not go as well toward the end of the project. The goal, he said, was to get the grade and not to pursue the project. As another participant put it, his assigned team had no guarantee of a common work ethic or a common vision.

A third factor involves *lack of passion* for the project. These results were aggregated into the "not among students' main goals" factor in Fig. 1 but are striking enough to merit additional discussion. Six participants indicated that a major reason for not launching a startup was that they and their teammates were simply not interested enough in their project. This is consistent with the view expressed by some participants, as discussed above, that the course was "just a class." For example, one product received a hugely enthusiastic response when presented at a 1 Million Cups of Coffee session, but the students felt that the product was not significant enough to justify devoting their life to it. "I wasn't going to revolutionize the world with a new hiking pole," said one of the team members. The students' lack of passion for their projects again relates to the nature of and pedagogy used in the courses. The junior-level courses involved, as a central element, the understanding of people groups and their needs; the students developed ideas

responsive to these needs. In the innovation course the students developed new ideas for products and services using creativity and ideation techniques, which were the central course content. The upshot was that the projects were developed in periods ranging from several weeks to a few months, all in the context of courses emphasizing design methods. These origins of projects stand in contrast to the projects seen in NSF I-Corps, which are typically the result of longer-term research from university laboratories by personnel who are emotionally invested in this research and its products. In the courses studied here, the students' projects lacked the original research base, the longer term for development, and the emotional investment.

A fourth factor relates to the students' *uncertainty about the path forward*—how to proceed from a practical standpoint. It is true that the students had the opportunity to apply for the VentureWell e-teams program and for a local NSF I-Corps program, but did not do so. The students also had access to multiple regional incubators but did not pursue this either. Yet it is also true that three of the participants indicated that a reason for not launching their project as a startup is that they were not sure about the path forward (see Fig. 1). This can be seen as failure to follow through on the incubate stage of the SEEM model. As one participant said, the team was not clear on what the next steps would be. Another participant noted that the junior-level sequence did not really have any component on where to go next. While the instructors went over the startups' opportunities in class, this material was not part of a formal course module, which might have made a bigger impression.

Additionally, some teams did not launch their project as a startup for reasons more inherent to innovation and entrepreneurship. Three participants mentioned reasons relating to the potential startup's commercial ecosystem, typically structural barriers to market entry. Other teams found that similar products were already on the market. And some teams simply concluded that their proposed technology was unworkable.

5. Discussion

The study's interviews appear to confirm the hypotheses (1) that students do not continue with their projects because they cannot take time away from the paying jobs that are supporting their education, (2) that students completing their junior year do not want to take time away from their senior-year studies, and (3) that students completing their senior year do not want to take the risk of pursuing a startup when they could instead obtain a "real" job. Additionally, student startups appear to have been discouraged by their expectation in the courses, by the composition of the project teams, by lack of passion for their projects, and by uncertainty about the path forward. What is to be done?

Even if they develop a startup project for which they have a passion, students at commuter schools, especially for students from minority populations, will still run into the barriers of time and money. Indeed, this study's key result is that the most significant factor is the students' need for income while pursuing their studies; even the students who wanted to pursue their project as a startup found themselves unable to launch a startup because of their employment. And a related factor involves the students' requirement of internships. A single solution could address both problems: provide modest financial support for students launching their startup and have their experience count toward the degree requirement of internships. The teams could obtain coaching

from a faculty mentor or from a regional incubator. Or, the startup internship program could be combined with a course that could provide both a framework for the team's activities and the practical path forward that some study participants indicated that they lacked. This approach could also address the issue of workload in the senior year, at least in the sense that the students could have a basis for a serious go/no-go decision before the start of their capstone course. Alternatively, the associated course could be implemented as a two-semester sequence that substituted for the traditional capstone sequence.

This approach would address most of the stumbling-block factors discussed above. Student expectations in project courses would no longer be a factor, because the point of the courses would be to develop knowledge and skills rather than to develop startups as such. The teams would be less burdened by problems of team composition because they would be self-selected rather than selected by instructors. Each team should have greater passion because they will already have an emotional investment in its project. And inclusion of coaching for the practical steps should reduce teams' uncertainty about the path forward. Not every student could or should be expected to participate in such a program; most students will still be looking for more traditional employment upon graduation. But for underrepresented commuter-school students with an interest in innovation, entrepreneurship, and startups, more students would be able to launch a startup if their ideas come from longer-term research, they can form their own teams, they have financial support to replace the income lost from their work while in school, and they have course support for moving their project forward.

Yet even if students did not have to work while in school, their project startups run up against the factor of lack of passion for the project. To produce student startup teams that have a world-changing product or service and that have a common work ethic and a common vision, the students' startups ought to be organized in teams that have pre-existing cohesion or vision, or ought to come from a prior, longer-term research effort or from some other key insight. In light of the factor of lack of passion for the project, one student suggested that students should be permitted to form their own teams. One way to approach this might be to survey the students about their passions at the start of the course, and then to group them in teams accordingly. Failing this, though, the study's results suggest that, from a policy standpoint, undergraduate programs in engineering (a) should strive to have as many students as possible participate in innovative technical research and (b) should expect startups to come from this research rather than from courses focused on methods of design and entrepreneurship. The courses can provide the knowledge and skills needed for successful launch of the research-based startups, producing startup-capable students who can be supported through follow-on courses and programs.

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