

Are Internships Good for Physics and Mathematics Students?

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Abstract:

An internship provides training of engineering students in their college careers. It prepares them to work in their field. If this is so successful for engineers, should internship programs be applied to physics and mathematics students? Or are those fields more theory than application?

Samuel Uncler had just arrived in the city. He had moved here to continue his studies in physics. He found his new apartment near the University, a loft in an attic of a converted factory, where he settled in for his first weekend. His longtime friend, Francis Dove, had recommended the apartment to him and had in fact set up the deal. He had to thank him first thing Monday.

Francis was an undergraduate in electrical engineering, he was to graduate next summer. Sam should have graduated already, he was uneasy with the reality of being older than his classmates. This caused conflict in his mind. Age is irrelevant, he would tell himself, but it never quite subdued his need to punish himself for his reluctance to choose a career field until now. His interest in physics had developed years ago, but he was afraid to pursue the study. He thought he'd fail. Now he was determined to see it through to graduation. He looked at his new apartment, his possessions strewn about, and breathed deeply.

Sam didn't get a chance to meet with Francis until two months into the semester. Francis had been busy with his studies and his internship; he was finishing his internship that fall,

working for a small engineering firm called Paradox Technologies. One afternoon he and Sam were sitting in a small coffee shop downtown.

“I really liked the internship, it taught me how an engineering job would be,” he said.

Sam took a sip from his cup, the coffee was getting cold. “I wish I could find something like that, it would reinforce the physics concepts.”

“How do you like the new apartment?”

“Fine, although the stairs are a bit of a chore. It is on the fourth floor after all.”

“Sorry about that, but I thought you’d like the building.”

“It’s nice. But it’s strange being in a new place, at a new university with new subjects.”

“You worrying about your classes?”

“Yeah. I’m afraid I just won’t get it. But I love physics, for what that’s worth.”

“Does your department have an internship program?”

“No, but I’ve been thinking of taking some EM classes from the engineering department as a substitute for classical physics, perhaps I can find an internship that way.”

“You really should, the internship helped me.”

Francis explained to Sam his experience with his internship. He told him how he was able to directly apply calculus to real-world problems and how concepts such as EMF, nonlinearity, and wave function which had mystified him, now made sense.

“I was doing rather poorly until I got to work with the problems first hand,” Francis said.

“The work emphasized the concepts I learned in class. Before, the equations were just some abstractions on paper for a post-modernist to dissect, but as I applied them, they became real.”

“I wonder about the state of physics,” Sam pondered. “I mean, is the whole thing theoretical or what? Learning trajectory problems, Newtonian mechanics, relativity, electricity, magnetism, and quantum mechanics was certainly informative but after the exams, what good is the work if I can’t apply it? Mathematics lacks an internship program too, but pure math is more mental masturbation than anything else, how could you translate that into a job?”

“Well I wouldn’t go as far to say that,” Francis retorted. “I was a math major for a little while.”

Sam shuffled in his seat. “Sorry. I’m just frustrated, that’s all. I’m tired of being berated by my professors. I suck at this and I suck at that. Can’t seem to do anything right.”

“You’re just having trouble fitting in, give yourself some time.”

“But I’ve been taking physics classes for nearly a year now, all told, and I’m afraid I just won’t get it.”

“Don’t be so hard on yourself, Sam, everybody learns differently.”

Sam stared out the window at the people passing in the street. He looked into his cup sticking his finger into his coffee. It was ice cold. “So you think an internship will help me?”

“Definitely. It helped me by reinforcing my knowledge of engineering and physics, it boosted my confidence and prepared me for work in the real world. It also enhanced my problem solving abilities which is paramount in the industry, I think. Yeah, I had successes and failures and I made a lot of mistakes, but it was under the guidance of my advisor and peers. By the time it’s over I will have spent a year as an intern, then I go back to college to finish my coursework, and then I’ll graduate. Physics would work very similarly, you should find out.”

Sam smiled, it was something he didn't do often. "I could use the confidence and the feeling of personal success. I want to be a good physicist but there doesn't seem to be much support. Don't get me wrong, I'm learning a lot from my professors, but I don't think they understand me."

"Well, Sam, do what you have to do. If you really want to become a good physicist as you say, then you'll find a way to carry out your plans, no matter what."

The internship program worked exceedingly well for Francis. By getting experience in his field he felt more confident in the work he would be pursuing once finishing his education. He could measure himself against his peers by his successes and failures in the field. As a student he had the flexibility to learn at a pace that was comfortable for him; he knew as a professional he would be a good engineer. The internship program provided valuable insight into engineering; the application of equations transitioned smoothly from classroom to industry, with a little help from the people at Paradox Technologies. He was on a solid track for a better, more satisfying job where he could pursue his thesis work in a productive environment. Sam, on the other hand, fell into a depression. He went to his classes and did his work but when it came to pursuing his thesis, he had to investigate it by his own means without peer support or a suitable environment where he could test the thesis's tenets. A few months after his conversation with Francis in the coffee shop, he had constructed a lab in his apartment. Nothing was going to get in his way of his success in physics, but a couple of things still nagged at him.

While obtaining equipment and designing his lab, he wrote papers about how physics at the University should be treated more like engineering. These papers addressed the problems of

physics and mathematics students who didn't have the kind of peer support and internship programs engineering students enjoyed. He noted that there should be a 50/50 split of theory and application of physics constructs and outlined a plan how it could be implemented. He felt that if he hadn't put a lab together and pursued his individual interests that he would be totally unprepared as a physicist. There was always graduate school, that is, if his grades were good enough.