

From Programming Zero to programming Hero, how an internship shapes future programmers in a CRO.

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ABSTRACT

Becoming a statistical programmer is a challenging leap, often compressed into a short onboarding process following graduation. But what if the learning process began 6 months earlier? Reflecting on my journey from intern to experienced professional, this paper takes a longitudinal perspective, examining the two-year impact of internships on skill growth and confidence building. Starting with training on dummy data to practice foundational techniques, programming from scratch and gradually transitioning to real studies with dedicated mentorship. I'll demonstrate how internships build essential skills while bridging academic theory and industry application. Well-structured programs prepare juniors for operational readiness and deliver significant organizational benefits. This paper is not about a career journey, it's an in-depth exploration of how internships create measurable value for both individuals and companies, seen through the lens of an intern-turned-professional.

INTRODUCTION

Embarking on an internship is often the first leap into the unknown, a transition from the structured world of academia to the dynamic realities of professional life. For me, that leap was especially steep. Coming from a biostatistics research background, I had no prior experience in programming, nor any exposure to the inner workings of a Contract Research Organization (CRO) or the private biopharmaceutical industry. These domains felt distant, almost opaque.

Yet internships serve as a vital bridge between theory and practice. They offer not only technical exposure but also the chance to build meaningful connections and shape individual learning paths. My internship became a turning point transforming uncertainty into confidence, and unfamiliarity into expertise. With the benefit of hindsight, I now fully appreciate its impact and can identify the key elements that made it such a formative experience.

HARD SKILL DEVELOPMENT

For newcomers entering the pharmaceutical industry, building strong technical foundations is essential. As a biostatistics graduate, I had some exposure to basic SAS programming, but my academic training was primarily focused on R. The transition into a Contract Research Organization (CRO) environment required not only adapting to new tools, but also understanding industry standards, regulatory expectations, and internal workflows governed by Standard Operating Procedures (SOPs).

One of the most impactful aspects of my internship was the opportunity to work on a dummy study a simulated clinical trial designed to replicate the conditions of a real project. This setup allowed us to apply SOPs in a practical context, using the same system architecture and documentation as active studies.

INTERNSHIP WORKFLOW

Under the guidance of experienced senior programmers, we were immersed in the full lifecycle of a clinical programming project. The dummy study included all essential documentation: Statistical Analysis Plans (SAPs), shells, metadata, and specifications. Our tasks followed the typical project progression:

- SDTM Mapping: Translating raw clinical data into standardized formats
- ADaM Derivation: Creating analysis-ready datasets
- TLF Creation: Generating Tables, Listings, and Figures for reporting

We rotated between roles in production and quality control, which gave us a comprehensive view of the programming process and the importance of precision. Each review, comment, or correction became a learning opportunity, highlighting areas for improvement and reinforcing best practices.

Toward the end of the internship, we were even given the chance to create reports and explore documentation typically reserved for lead programmers. This exposure deepened our understanding of project oversight and communication.

Then, with the sponsor's agreement, we were integrated into a live study. Because our hours weren't billed, our involvement posed no financial burden to the sponsor or the project team. This unique arrangement allowed us to apply our training in real-world conditions, working within timelines, collaborating across platforms, and communicating through meetings, issue logs, and documentation channels.

Being part of an active study exposed us to the complexities of real data, sponsor expectations, and operational constraints. We encountered discrepancies, navigated evolving requirements, and learned to manage time and resources effectively. It was a hands-on exercise in translating theory into practice, an invaluable experience that solidified our understanding and accelerated our professional growth.

CODING FROM SCRATCH

Working on a randomized, complete study gave us the rare opportunity to start with a blank slate. We developed all code from scratch, without relying initially on reporting macros or automation tools. In an industry increasingly shaped by automation, this hands-on experience was invaluable, it allowed us to internalize the logic behind each step and build a solid programming foundation before layering in efficiency tools.

As we progressed, we were introduced to macros and automation frameworks, learning how to integrate them into our workflow while appreciating their underlying mechanics.

OFFICE-BASED LEARNING

Being office-based significantly accelerated our technical development. Faced with coding challenges, we first attempted to resolve them independently an essential part of the learning process. But when we hit a wall, help was always within reach. Direct access to mentors and peers enabled quick feedback, collaborative debugging, and the sharing of best practices. This iterative cycle, try, fail, learn, and ask proved to be one of the most effective ways to build hard skills.

Live explanations were particularly impactful. They helped us develop problem-solving abilities, sparked interest in new processes, and provided a broader understanding of the company's missions and the role of a statistical programmer. Live explanations were the best way to learn and develop problem-solving skills and help get interested in new processes, get a more global view of the missions of the company and of a statistical programmer.

We were also exposed to a wide range of roles, giving us valuable cross-functional insight into different levels and jobs. Face-to-face conversations with data managers and biostatisticians helped build a different kind of relationship based on mutual understanding and collaboration. This proximity made it easier to grasp the requirements of each role and facilitated smoother first interactions. Compared to other juniors who may not have had this exposure, we had the opportunity to enhance communication between key roles, strengthening teamwork and project efficiency.

On a more human level, being office-based during an internship eased the transition into the working world. It fostered the development of soft skills in a more conscious and natural way. In an era where remote work is increasingly common, integrating junior programmers into large companies presents a unique challenge. Office presence helps maintain team engagement and company culture. Feeling involved and interested in your work is key to building a fulfilling career and progressing on the corporate ladder.

SOFT SKILLS DEVELOPMENT

Being a strong statistical programmer is not just about technical expertise, it's also about communication, collaboration, and confidence. As juniors, learning to ask the right questions, communicate effectively, and understand team dynamics is crucial. Confidence enables us to ensure quality, avoid rookie mistakes, and contribute meaningfully to study work.

Internships create a safe space to develop these skills. They teach us how to identify the right person to ask, how to frame questions, and how to grow into our professional roles with legitimacy and clarity.

Our work is composed of two types of communication canal: via teams, email and in-person. In a global company being able to communicate clearly and effectively remotely is very important and not that obvious.

Being office-based is also a key component of this success. Allowing me to be in contact with many departments and many types of roles and feelings involved in the company life and getting more insights into the organization of the company.

Lunch breaks also helped me feel welcome and presented a safe working place.

PERSONAL EXPERIENCE: FROM INTERNSHIP TO EMPLOYMENT

My internship began in March and lasted six months, based in the Geneva office. As a public health student, the subject of the internship was highly aligned with my academic background and met the requirements set by my university. This experience served as a valuable bridge between academic theory and practical application within the pharmaceutical industry.

CHALLENGES

One of the biggest challenges was starting from zero. I had no prior experience with CDISC standards or high-level project management. While I wasn't directly managing projects, I needed to quickly understand the broader context and workflows involved, which was essential for aligning with the expectations of the role.

It was also a humbling experience to realize that some skills only come with time and practice. The learning curve was steep, and although I progressed quickly, mastering tasks like programming ADaMs in SAS or identifying programming issues in macros requires more than just theoretical knowledge, it demands hands-on experience and patience.

Another key lesson was understanding that no one is an expert in everything. It's important to consult documentation, ask questions, and take initiative when facing issues or discrepancies.

This period also prompted important reflection: is this the career path I want to pursue and grow in?

The most significant challenge was accepting that some skills only come with time and experience. The learning curve was steep and, although I progressed quickly, mastering tasks like programming ADaMs or identifying data issues in macros doesn't happen overnight.

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Following the internship and a constructive discussion with my manager, I was offered a junior position as a **Statistical Programmer I** for the following year.



I accepted this opportunity for several key reasons:

Clear understanding of the role: The internship gave me direct exposure to the day-to-day responsibilities of a statistical programmer, allowing me to make an informed decision about my career path.

Supportive management: I appreciated the approachable and structured management style, which fostered both learning and professional growth.

Career development opportunities: The company offered a transparent and motivating path for progression, which was important to me as a junior professional.

Work environment and location: The office-based setting in Geneva provided a collaborative and engaging atmosphere, ideal for early-career development. Beyond the professional benefits, the location itself played a role in my decision. Geneva offers a unique blend of international culture, natural beauty, and quality of life. Working in such an environment made the experience not only professionally enriching but personally enjoyable.

Workplace flexibility: While the internship was fully office-based, I appreciated the company's flexible approach to work arrangements. This balance between structure and autonomy contributed to a healthy and productive work culture, especially valuable for junior employees navigating their first professional experience.

After completing the internship, I took a four-month break before returning to the company. This gap allowed me to clearly observe the difference in my operational readiness. Upon rejoining, I was able to contribute immediately to the same study I had previously worked on, thanks to the continuity and familiarity with the project.

I returned during a high-intensity period, which further emphasized the value of having a more experienced programmer on the team. Their guidance not only helped me navigate the workload but also created a dynamic natural mentorship. This support was instrumental in reinforcing my confidence and efficiency.

Overall, the internship served as a strong foundation for my transition into full-time employment. It significantly reduced the onboarding time and enabled me to start my first job with a sense of preparedness and purpose.

CONCLUSION

Reflecting on the professional I am today, it is clear that this internship had and continues to have a significant impact on my career as a statistical programmer. It helped me build confidence and develop essential instincts that support both the quality and critical thinking required in my daily work.

More than two years later, I can confidently say that the skills, habits, and mindset cultivated during the internship still contribute to my growth and efficiency. The experience laid a strong foundation that continues to shape my career trajectory.

For any CRO considering the development of a junior onboarding program, I highly recommend investing in a well-structured internship model. With strong leadership, a supportive environment, and a genuine commitment to mentoring junior talent, this approach can be incredibly rewarding for both the company and the intern.

While it does come with its share of challenges for both the organization and the student it ultimately leads to one of the most valuable and positive experiences for everyone involved.

Ultimately, companies should remember that they are shaping their next generation of professionals and investing in that future is not only strategic but essential.

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