2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
Paper ID #52340

Improving Technical Internship Outcomes Through Supervisor Professional Learning

Dr. Christopher Russell, Northern Virginia Community College

Christopher Russell is the Information and Engineering Technologies Project Manager at Northern Virginia College. His research focuses on developing novel methods of integrating digital fabrication into formal and informal STEM instruction. Currently, he manages two NSF ATE awards - Makers By Design, a design thinking professional learning program for interdisciplinary groups of educators, and Product Design Incubator, a summer-long entrepreneurship program for community college students.

Dr. Jennifer L Maeng

Research Associate Professor; Curriculum, Instruction, and Special Education; School of Education and Human Development

Josh Labrie

Josh earned a B.S. in Chemistry and a Master's in Teaching at the University of Virginia, and taught chemistry and physical science in Prince William County Public Schools for 9 years. He joined Northern Virginia Community College (NOVA) in 2012 as the program manager of NOVA SySTEMic, the college's STEM program to expand regional capacity for STEM talent in northern Virginia. As the Director of NOVA SySTEMic he leads the team in STEM Outreach, manages NOVA's Perkins V award, and maintains a portfolio of NSF and private grants to support STEM and CTE pathways in the region.

Dr. Amanda Gonczi,

Dr. Amanda Gonczi is an Assistant Research Scientists at Michigan Technological University. She conducts research in STEM education and has a particular interest in teachers' engineering and technology integration.

IUSE: Improving Technical Internship Outcomes Through Supervisor Professional Learning

I. Introduction

The need for educators to prepare students to operate in a digital environment and for information and communication technology (ICT) careers is a global challenge. Reliance on computing infrastructure (e.g., cloud computing, artificial intelligence) has amplified the need for skilled workers to support this infrastructure [1], [2]. Alongside this increased reliance, there is a widespread recognition that institutes of higher education (IHEs) should be more responsive to labor market needs and should prioritize successful employment for graduates [3]—[5]. Internships are a way IHEs can support the development of students' skills in the workplace. Internships may improve ICT program outcomes (e.g., decreased time-to-degree completion, increased employment and professional socialization; [6], [7]) and provide an opportunity for students to learn professional skills that complement but are not typically taught during classroom instruction [8]. Within such internships, supervision quality and characteristics are critically important in supporting high quality student learning experiences and outcomes [9]. These internship models require partnership between IHEs and internship sites in ensuring internships are mutually beneficial to all stakeholders.

The SuperPL project aimed to improve internship outcomes in the ICT sector through implementing professional learning (PL) for front-line internship supervisors. The project had three main partners: Northern Virginia Community College (NOVA), Prince William County Public Schools (PWCS), and the University of Virginia. SuperPL had two primary project components:

1. **ICT Internship Program:** a summer internship program for students in NOVA's various ICT programs (e.g., cybersecurity, information technology, cloud computing). NOVA also implemented a student career development program to help students be competitive for internships.
2. **Supervisor Professional Learning (PL) Program:** NOVA designed and implemented a PL program for front-line IT personnel at PWCS. The PL program was intended to improve the quality of intern supervision.

NOVA led project activities, prepared and recruited students for internships, and developed and implemented PL for internship supervisors. PWCS conducted internships, identified supervisors, and supported supervisors in completing data collection activities. UVA developed research and survey instruments and led data analysis and dissemination efforts.

II. Program Components.

SuperPL was structured in yearly cycles consisting of career preparation program for students, professional learning for internship supervisors, internship recruitment and placement, and follow-up data collection.

Career Preparation for Students. Students from NOVA's ICT programs were recruited to participate in a spring semester program designed to prepare students to apply for and work in summer internships (Table 2). This professional preparation program is an ongoing program that adapts common career preparation elements (e.g., resume writing, interview practice) into an ICT and regionally specific format. Each project year, the goal was to enroll 50 students in this program, with program completers encouraged to apply for competitive internships.

Table 1. Internship preparation program components

Activity	Time	Description
Recruitment	Fall Semester	Recruitment of students from AAS information systems technology, AAS cybersecurity & ICT-based certificate programs in IET division.
Orientation and Pre-Assessment	December & January	Students attend orientation, complete pre-assessment, and submit SMART (specific, measurable, achievable, realistic, and timely) goal.
Resume Writing	January	Students learn the components of an effective resume from career development professionals. Students review sample resumes in small groups, then create a resume and submit it for review and feedback from a program mentor. Students then review their resumes with hiring managers and recruiters from industry partners.
Interview Preparation	February	Students review common interview questions and discuss appropriate responses. Hiring managers from employer partners explain how they evaluate candidates. Students complete a mock interview with program mentors and hiring managers and receive direct feedback.
Networking	March	Students learn and practice networking techniques and develop a LinkedIn profile.
Leadership	March – April	Students attend one additional career or leadership workshop of their choice (e.g., diversity equity and success, conflict resolution, communication, security clearances and certifications).
Completion	April	Students create a final project that includes a reflection and a final dossier (i.e., resume, LinkedIn profile, SMART goal) of all materials necessary to apply for summer internships. Completion event with employers, students and staff.

Supervisor Professional Learning. Prior to working with students, internship supervisors participate in a 4-session PL that focused on improving internship outcomes by learning and planning the integration of research-based strategies (Table 2). PL centered around three foundational topics: mentoring (building relationships between established professional and a protégé), task/goal clarity (structuring work tasks to ensure tasks are clear, goals are mutually understood, and opportunities for feedback are built-in), and autonomy (balancing intern independence with more structured and guided work tasks).

Table 2: Supervisor Professional Learning Overview

Session and Supervisor Role	Description
Session 1: Internship Details and PL Overview (2 hours, In-person)	Introduction to PL topics, work structure, project details, communication and assessment, meet and greet with NOVA personnel & faculty
Session 2: Asynchronous Training (8 hours, on-line)	Supervisors complete Virginia Talent & Opportunity Partnership (VTOP) intern supervisor training

Session 3: Training Review (4 hours, In-person)	Supervisors develop lists of expected tasks, review communication mechanisms to benchmark student preparation and growth, develop preliminary mentoring plan
Session 4: Intern Orientation (2 hours, in-person)	Supervisors meet their assigned interns in-person at NOVA and implement the first steps of their mentoring and supervision plan.

The PL was informed by elements of effective PL (e.g., [10]—[12]) including (a) actively engaging participants, (b) providing opportunities for collaboration; (c) supporting context specificity; and (d) fostering reflection to facilitate learning regarding effective supervision and support adoption of desirable strategies. PL implementers *model* and distinguish between implicit/explicit instruction, the use of questioning to foster learning and reflection, the use of rubrics to provide feedback. Modeling and subsequent debriefing of desirable strategies is a core principle of PL [13], [14]. During PL supervisors develop and receive feedback on products designed to support effective supervision and internship learning including (a) list of targeted skills, planned opportunities for development, and a record of achievement; (b) a feedback/reflection document to provide formative and ongoing feedback and to foster internship reflection. Supervisors are supported in developing their own supervision instruments to further support active learning, reflection, and to provide an opportunity for feedback from PL implementers and colleagues. Finally, just-in-time ongoing support is facilitated through email and more formal virtual "check ins". Such support is a critical PL component that facilitates individual and systemic change by differentiating support according to individual needs and facilitating collaboration [`4]**.**

Internships. Students from target program areas applied for summer internships with PWCS. NOVA provided a first round application and eligibility review and then PWCS conducted student interviews for selected candidates. Internships consist of students spending up to 150 hours working at a PWCS school site. Typically, interns worked between 25-30 hours per week over a period of 6 weeks, with internship duration varying depending on the needs of the supervisor. Interns are paired with a school or center-based supervisor to support the IT infrastructure while providing frontline customer service to teachers, staff and students with devices, networks, and instructional technology. Supervisors are provided with their intern's dossier and coursework completion. Supervisors review their assigned intern's dossier and educational background and provide their intern with (1) an overview of the expected projects, (2) a weekly schedule, (3) instruction and support for specific tasks, and (4) an introduction to the work environment (e.g., personnel, facility). Supervisors have broad latitude to structure the internship experience as they deem appropriate by assigning tasks that meet the technology needs of the school. Project staff from the NOVA check-in with each intern and supervisor bi-weekly to verify work hours and ensure the work environment is productive.

III. Data Collection and Preliminary Project Results

The project resulted in 92 internship placements at PWCS and provided career preparation to 218 students in NOVA's computing disciplines. 37 supervisors from PWCS completed supervisor training, with approximately 75% of supervisors returning in subsequent project years to supervise additional interns. Of the 92 interns, 12 were offered full-time employment after their internships and 8 accepted. Of the former interns who accepted positions with PWCS, 2 went on to become supervisors of interns themselves.

Supervisors completed the Mentoring Competency Assessment (MCA; [15]) prior to completing the PL and after supervising an intern. The MCA is a validated instrument for mentee-mentor pairs in the context of internship training, though its use has been primarily in clinical and university research settings. The MCA evaluates six mentorship areas: effective communication, aligning expectations, assessing understanding, addressing diversity, fostering independence, and promoting professional development on a scale of 1 to 7 (total possible score = 42). Light modifications were made to the instrument (e.g., removal of the word "clinical") for its use in the ICT setting. Supervisors completed the MCA prior to beginning the PL program and after supervising their first intern.

Of the 37 supervisors who participated in the first 3 project years, 26 completed both the pre- and post-MCA and provided informed consent. Results showed significant improvement in supervisor self-assessment in the quality of the mentoring they were able to provide. Prior to PL, supervisors reported medium confidence in their mentoring capabilities (M=30.6, SD=6.3, Med=30.5). After the PL, supervisor confidence across all constructs was significantly higher (M=36.2, SD=4.8, Med=36.0).

Investigators followed up with student interns both 1 and 2 years post-placement, with results from the 2-year follow-up recently collected. Intern attitudes towards ICT and professional socialization were measured using the Student Attitudes in Information Technology instrument [16] and Hund & Bueno's [17] study of student professional skills developed during out-of-class work experiences. While qualitative open-ended responses collected from students indicated that students found value in their internship experiences, there was no significant difference between pre- and post-test measurements. Additionally, interns whose supervisors had completed PL did not have different outcomes from interns whose supervisors had not completed PL prior to their internship. An ongoing issue is the difficulty of soliciting 1- and 2-year follow-up data—even with small financial incentives—due to the shorter duration of community college programs and more transitory student body.

While results and data collection are still ongoing, current results suggest that the supervisor PL did not have a significant effect on student outcomes, measures of professional socialization, or attitudes towards ICT. These data may reflect two features of robust, paid work-based learning. First, internships were highly selective and included a first round of screening from NOVA followed by an interview process with PWCS. Given that these internships were well-compensated and specifically addressed IT—one of the largest programs at the college—the number of student applications often numbered in the hundreds. As a result, selected students may have already demonstrated high levels of professional skills prior to their placement. Secondly, discipline-relevant internships are a well-known high impact practice (Kuh et al., 2008) and are associated with improved employment outcomes. In this case, a PL program for supervisors may only effect a marginal improvement on an already effective practice. Though data collection and analysis for this project are not yet final, it may be that IHEs would realize better outcomes by devoting resources to expanding access to discipline-relevant work-based learning in lieu of preparing supervisors.

This material is based upon work supported by the National Science Foundation under Grant Number 2055324. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

References

[1] Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, *25*(6), 5261–5280. https://doi.org/10.1007/s10639-020-10219-y

[2] Wosik, J., Fudim, M., Cameron, B., Gellad, Z. F., Cho, A., Phinney, D., Curtis, S., Roman, M., Poon, E. G., Ferranti, J., Katz, J. N., & Tcheng, J. (2020). Telehealth transformation: COVID-19 and the rise of virtual care. *Journal of the American Medical Informatics Association*, *27*(6), 957–962. https://doi.org/10.1093/jamia/ocaa067

[3] Amara, A., & Carvalho, M. T. (2002). *Autonomy and Change in Portuguese Higher Education*. www.magna-charta.org

[4] Teichler, U. (2009). *Higher Education and the World of Work: Conceptual Frameworks, Comparative Perspectives, Empirical Findings*.

[5] Wilton, N. (2012). The impact of work placements on skills development and career outcomes for business and management graduates. *Studies in Higher Education*, *37*(5), 603–620. https://doi.org/10.1080/03075079.2010.532548

[6] Callanan, G., & Benzing, C. (2004). Assessing the role of internships in the career-oriented employment of graduating college students. *Education + Training*, *46*(2), 82–89. https://doi.org/10.1108/00400910410525261

[7] Wan, C. S., Yang, J. Te, Cheng, S. Y., & Su, C. (2013). A longitudinal study on internship effectiveness in vocational higher education. *Educational Review*, *65*(1), 36–55. https://doi.org/10.1080/00131911.2011.634969

[8] Coco, M. (2000). Internships: A Try Before You Buy Arrangement. *SAM Advanced Management Journal*, *65*(2), 41–41.

[9] Metso, S., & Kianto,A. (2014). Vocational students' perspective on professional skills workplace learning. *Journal of Workplace Learning, 26*(2), 128-148.

[10] Hill, H. C., Beisiegel, M., & Jacob, R. (2013). Professional Development Research. *Educational Researcher*, *42*(9), 476–487. https://doi.org/10.3102/0013189X13512674

[11] Luft, J. A., & Hewson, P. W. (2014). Research on Teacher Professional Development in Science. In N. G. Lederman & S. K. Abel (Eds.), *Handbook of Research on Science Education* (pp. 889–910).

[12] Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What Makes Professional Development Effective? Strategies That Foster Curriculum Implementation.

American Educational Research Journal, *44*(4), 921–958. https://doi.org/10.3102/0002831207308221

[13] Capps, D. K., Crawford, B. A., & Constas, M. A. (2012). A Review of Empirical Literature on Inquiry Professional Development: Alignment with Best Practices and a Critique of the Findings. In *Journal of Science Teacher Education* (Vol. 23, Issue 3, pp. 291–318). https://doi.org/10.1007/s10972-012-9275-2

[14] Luft, J., Bang, E., & Hewson, P. (2016). Help Yourself, Help Your Students. *The Science Teacher*, *083*(01). https://doi.org/10.2505/4/tst16_083_01_49

[15] Fleming, M., House, S., Hansen, V. S., Yu, L., Garbutt, J., McGee, R., Kroenke, K., Abedin, Z., Rubio, D. M. (2013). The Mentoring Competency Assessment: Validation of a new instrument to evaluate skills of research mentors. *Academic Medicine, 88,* 1002-1008.

[16] Forssen, A. V., Moskal, B. M. & Harriger, A. R. (2011). Measuring the impact of a high school intervention on students' attitudes in information technology. Validation and use of an attitude survey. *Proceedings of the American Society for Engineering Education.* Retrieved from: https://www.asee.org/public/conferences/1/registration/view_session?session_id=343

[17] Hund, A. M. & Bueno, D. (2015). Learning in out-of-class experiences: The importance of professional skills. *Psychology Learning & Teaching, 14,* 62-69. DOI: 10.1177/1475725714565232