Case Study of Transforming and Scaling Entrepreneurial Internship Access in IHE

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This case study explores innovative approaches to expand access to high-quality internships and improve equitable student outcomes. It focuses on Lehigh University's virtual Innovation Internship program, partnered with the Nasdaq Entrepreneurial Center and Epixego Inc. The program aims to address challenges in traditional internships, such as hidden curriculum, false narratives, and unequal social environments. By incorporating self-assessment of learning competencies and enhancing student agency, the program doubled its capacity to 40 students. The study measured student self-efficacy, occupational identity choice, and outcome expectations based on various factors. Results showed that students changed internship preferences across occupation categories and experienced increases in entrepreneurial self-efficacy (3%), occupational identity (7%), and perception of entrepreneurship education (4%). This multifaceted approach demonstrates the potential for innovative internship designs to improve accessibility and student development outcomes.

Keywords: internship, entrepreneurial self-efficacy, learning competencies, scaling access, designing for equity

LITERATURE REVIEW

Internships and experiential learning play a vital role in higher education. Experiential learning approaches that integrate work experiences, such as internships, apprenticeships, and cooperative education programs (co-ops), are widely acclaimed as highly effective and impactful practices that contribute significantly to student success (Kuh, 2008). They help students discover the connections between their academic majors and future careers and test out these interests and connections experientially, most commonly through internships (O'Neill, 2010). Internships offer a multifaceted experience that caters to

the diverse needs of students. (REF) For those still exploring their academic and career interests, an internship provides an invaluable opportunity to gain exposure to organizations and industries that comprise the professional landscape.

On the other hand, for students with a clearer vision of their career goals and academic pursuits, an internship serves as a platform to put their learned concepts and principles into action by engaging with authentic, hands-on scenarios that mirror real-life professional environments. It enables them to acquire substantial professional experience and begin cultivating a network of contacts within their desired fields. Regardless of their stage in the career exploration process, internships challenge students to take an active role in shaping their short-term and long-term plans. (Binder et al. 2014) In the short term, research findings have demonstrated that participating in internship experiences can yield several beneficial outcomes for students, including improved academic achievement, heightened self-assurance in career-related choices, enhanced employability prospects, and greater fulfillment within their chosen professional paths. (Hora, 2017). Engaging in alternative forms of experiential learning opportunities that integrate practical work experiences, such as apprenticeship programs and cooperative education arrangements, also has benefits on academic success and college enrollment (Amest & Claro, 2021) as well as job placement and starting salaries (Main et al., 2019; Neyt et al., 2020).

Additionally, internships play a crucial role in entrepreneurial pedagogy. Entrepreneurship is vital in driving economic value creation by fostering innovation, generating employment opportunities, and fueling economic growth (van Praag & Versloot, 2007; van Stel, et al., 2005). The inherent nature of entrepreneurship, characterized by uncertainty, ambiguity, action, and dynamism, suggests that an experiential pedagogy is the most suitable approach for teaching the discipline in a university setting (Neck & Greene, 2011). This pedagogical method requires learners to venture beyond the confines of the classroom, applying relevant theoretical knowledge at various stages of the entrepreneurial process and reflecting on the perceived outcomes. The fundamental concept behind experiential pedagogy is to mirror reality by dissolving the boundaries between educational and professional life, allowing students to gain practical experience that aligns with the demands of both the entrepreneurial and intrapreneurial world.

In a recent evaluation by the U.S. Department of Education's Baccalaureate and Beyond Longitudinal Survey, it was found that undergraduate students who participated in paid internships experienced a predicted increase of $3,096 in their annual wages one year after graduation compared to those who did not undertake paid internships (Torpey-Saboe et al., 2022). This finding highlights the significant positive impact that paid internship experiences can have on the early career earnings of college graduates, providing them with a substantial financial advantage in their first year of employment after completing their degrees.

The study also found that participating in internships and work-based learning was associated with better outcomes based on the value of education in achieving goals. Despite the evident benefits of internships, Torpey-Saboe et al., 2022 noted significant differences among racial/ethnic groups of college graduates having access to internships. Under one-third of individuals who received a bachelor's degree stated they participated in a paid internship during their undergraduate studies, with white males being the most likely group to have experienced a paid internship. The access gaps were also strong based on fields of study, with participation ranging from 56% in engineering and technology to less than 40% in business and 10% in general studies. Additionally, students from low-income backgrounds and those who are the first in their families to attend college are disadvantaged when gaining practical work experience through internships or other experiential learning opportunities. Work-based learning programs offer a powerful solution to many job seekers' challenges - gaining relevant work experience to secure employment independent of familial history or prior social capital.

However, the cost of providing paid internships is particularly significant when considering the need for a talent pipeline. While interns are the number-one way leading companies fill their early talent pipeline, they can be prohibitive for startups. Nearly half of the interns hired by US businesses between 2021 and 2017 did not convert to full-time employees after their internship period (NACE, 2021). An average cost of over $21,000 per intern represents a significant financial investment that fails to yield long-term returns for companies (NACE, 2021). The fact that approximately 45% of intern spending essentially goes to waste when college students leave and never return highlights a concerning imbalance and inefficiency in the

internship process. It is, therefore, necessary to have employer-education partnerships that can scale such internship experiences for STEM and non-STEM majors across racial and economic disparities.

This case study highlights the results of an industry-university-non-profit partnership between Lehigh University, the Nasdaq Entrepreneurial Center, a non-profit institution supporting entrepreneurship, and an Artificial Intelligence (AI)-Technology- Epixego Inc., for scaling *access* to entrepreneurial internships for students across disciplines and backgrounds.

Content

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This project aimed to measure the impact of high-impact entrepreneurial internships designed to be accessible to students from diverse backgrounds across race and socioeconomic strata at LU. Aspects of 'designing' the internship experience include (a) students visualizing individual self-competency from past experiential and traditional pedagogies (competency-fingerprint), (b) demonstrating the pervasiveness and transferability of competencies across disciplines and contexts, (internship suggestions based on competency-fingerprint) (c) challenging cultural norms of entrepreneurship, with the types of startups and their founders (Center's community of entrepreneurs).

METHOD

LU's Innovation Internship program is a high-impact, experiential learning opportunity facilitated through a 3-credit course- for students seeking an integrated, real-world internship experience in entrepreneurship, innovation, and/or social impact. Through LU's partnership with the Center, startups that are part of the Center's vibrant startup community offer internship opportunities.

Competencies acquired during experiential learning are anticipated to translate into graduates' employment (Martin et al., 2013; Unger et al., 2011; Baldwin & Ford, 1988). With an estimated cost of $1 trillion in voluntary turnover at companies in the US (Gallup, 2019), internships are the leading way for companies to hire early talent (NACE, 2021).

The Innovation Internship program was made available to 41 undergraduate and graduate students at Lehigh University from various disciplines through the project. 52 potential internship opportunities were exclusively made available for this program through startups affiliated with the Center. Two surveys were admin flustered to answer the following research questions- (a) ask students to identify the top 5 preferences for an internship and their perception of being a 'good fit' for each preference using a Likert scale; and (b) ask students to self-assess their entrepreneurial education, self-efficacy, and occupational identity before applying for an internship [pre], and after finalizing their internship [post]. Quantitative measures for entrepreneurial education, self-efficacy, and occupational identity were adapted from Wardana et al., 2020, Burnette et al. 2020, and NAS, 2019.

Research Question #1: *Does designing internship programs that allow students to translate their learning into competencies broaden participants' understanding of skills and competencies, leading to changing internship preferences?*

Research Question #2: *Does describing internship opportunities and student learning through competencies increase students' self-efficacy in applying for internship roles?*

Research Question #3: *How does increasing access to internship opportunities change perceptions of the value of education and occupational identity when using competencies to discover roles?*

RESULTS AND DISCUSSION

Student participants viewed a coded set of job descriptions for each of the 52 internships, which formed the control data set. The job descriptions contained the job title, job description, required skills, and a code for the company name. Students also reviewed a collection of job internship preferences published as PDF files, and each student identified up to five preferred roles with a self-perception of how good a fit they may be for the role.

For the test data, each student completed their learning journey reflection on Epixego using a competency vocabulary and visualizing their personalized competency fingerprint. Every startup created a 'modified' job description that included fields such as 'the vision and mission of the company and the 'required and desired competencies' for the role. This information was used to develop a unique competency fingerprint for the role. Each student had an automated personalized suggestion of internships based on the best competency fingerprint match between the student and the role. Students then identified up to five internship roles preferred and, for each role, indicated their self-perception of being a good fit. The 52 internships were categorized into 12 different job clusters by LU's program to align with LU's pedagogical boundaries, which are as follows:

1. WEB DEVELOPMENT
2. GRAPHICS/UI/UX DESIGN
3. SOFTWARE DEVELOPMENT
4. ELECTRICAL/COMPUTER ENGINEERING
5. DATA ANALYSIS/ML
6. MARKETING
7. PRODUCT DEVELOPMENT
8. BUSINESS DEVELOPMENT
9. BUSINESS OPERATIONS
10. FINANCIAL ANALYSIS
11. ACCOUNTING
12. SUPERVISOR/ MANAGEMENT

Among the 41 students who participated in the internships, over 90% completed both the control and test surveys (n=37). When student participants used a language of competencies to reflect on their learning journey, their choice of internship preferences changed by 40%. In other words, students, on average, changed 2 out of 5 internship preferences when using competency-based language to translate their learning journey and internship preference. Additionally, the roles were in *new* job clusters compared to the control. For example, students who initially selected 'DATA ANALYSIS/ML' internships selected 'MARKETING' or 'BUSINESS DEVELOPMENT' internships using a competency-based learning reflection and translation of roles. The average self-efficacy for the new roles selected was 3 on a Likert scale ranging from 1 = unlikely fit and 5 = likely fit.

These results support Research Question #1, indicating that when students translate their learning into competencies, their internship preferences change up to 40% of the time compared to preferences purely based on their majors.

For Research Question #2, the inferences of the results help clarify the finding. It can be inferred that roles not selected the first time indicate roles where the candidate's self-efficacy for the role would have been 1 = unlikely fit. Given that the average self-efficacy for the new internship roles selected was 3, it can be concluded that describing internship opportunities and student learning through competencies is likely to increase the student's self-efficacy.

Of the 41 students, 65% responded to a self-assessment of their entrepreneurial education, self-efficacy, and occupational identity before the internship experience (n=27), while 39% responded (n=16) after being placed in their internship. The results indicate a % increase in student entrepreneurial self-efficacy by 3%: the extent to which students are confident about their entrepreneurial skills to complete various tasks and projects; ~4% increase in the value of their entrepreneurial education; and a 7% increase in their occupational identity. Occupational identity is a central, complex concept of career development that

provides a sense of direction and meaning to career development (Lent, 1994). Many factors influence it, including choice of education and learning and sociocultural perspectives. Sample questions to infer changes in Occupational Identity include- "It is a high probability that in the foreseeable future, I will start my own business." This case study confirms the critical role of work-based internship experiences in broadening occupational identities and intergenerational occupation persistence (Alonso-Carrera et al., 2020).

TABLE 1
AVERAGE CHANGE IN STUDENT SELF-ASSESSMENT MEASURED BEFORE THE START OF THE INTERNSHIP EXPERIENCE AND AFTER BEING PLACED IN THE INTERNSHIP

The average % change in student entrepreneurial self-efficacy	3.02%
The average % change in student perception of the value of entrepreneurial education	3.92%
The average % change in occupational identity	7.7%

For context, average scores of short-term interventional programs measuring higher education students' academic self-efficacy vary between 1% - 20% (Walter et al., 2015).

The data from this project confirms the decisive role of internships and their design in allowing programs to effectively dissolve the boundaries between educational and professional life, helping students gain practical experiences that align with the demands of both the entrepreneurial and intrapreneurial world.

CONCLUSION

Our findings add to the evidence that work-based learning, particularly internships, can be designed to be more accessible while also (a) helping students gain confidence in their learning journey and broaden their understanding of competencies as relevant to internships; (b) providing the noneconomic benefit of a stronger feeling of self-efficacy and potential goal achievement and career satisfaction. This case study demonstrates an emerging model for work-based learning. Innovations in technology interventions, higher-ed institutions, and non-profit entities with access to a diverse start-up ecosystem have developed a model to expand access to internships to students who may not receive those opportunities. The ecosystem of players brings a promising model to tackle the disparities in internship access and a nuanced exploration of the benefits of such a partnership. One of the reasons for the lack of widespread availability of work-based learning opportunities is the cost of administering such a program.

The growing number of startups in the Center are founded by underrepresented founders with a social mission. Through the Center, the startups minimize their talent risk by working with an IHE channel, LU, to nurture their early talent pipeline that aligns with an employer's mission and vision.

A program such as LU's Innovation Internship effectively facilitates the experiential learning opportunity through a 3-credit course, allowing students new to experiential learning to develop their skills as they learn. Ultimately, the program leverages technology (Epixego) to expand the program's reach to more students and dissolve the boundaries between educational and professional life through a competency-fingerprint-enabled internship discovery and matching process. The technology has allowed LU's Innovation Internship program to double the number of students that the program accepts each semester. With an average estimated $10,000 - 20,000 per student (ibid) for IHE to administer high-impact work-based internships, programs become accessible only to a few 'savvy' students. Public-Private-Non-profit partnerships, such as the one between Epixego-LU-the Center, offer a roadmap for upending the 'hidden curriculum' (NAE, 2020) that perpetuates the status quo of uneven access to internships. They narrow the disparity in internship participation based on majors, reflecting a field's dominant norms, values, and beliefs (Baker, 2000; Holland et al., 2001). When viewed through the lens of human capital theory, entrepreneurial

education is a human capital investment, and entrepreneurial competencies are entrepreneurship-related human capital assets (Nabi et al., 2017; Martin et al., 2013). With over 104 student applications for LU's Innovation Internship program in Fall 2024 and 168 new internships being offered at the Center, the cost of scaling such impactful programs is significantly lower (<$10/student), thereby making such high-impact programs more accessible to students and entrepreneurial startup founders. This case study provides a way to increase access to internships, thereby unleashing human capital development for the Future of Work.

The study has some limitations, especially concerning the applicability of this model in other geographies and work-based learning programs such as co-ops, apprenticeships, and the analysis techniques used to analyze the data, which has room for further iteration and improvement. Future studies can include a mixed-methods study, including qualitative and quantitative methods. Despite this, the findings prove the effectiveness of transforming and scaling entrepreneurial education and work-based entrepreneurial internships through mutually beneficial private-public-non-profit partnerships. This case study justifies the argument that brokering connections between education and work needs to increasingly be a part of a broader undergraduate education in the United States.

REFERENCES

Alonso-Carrera, J., Caballé, J., & Raurich, X. (2020). Intergenerational mobility in education and occupation. *Macroeconomic Dynamics*, *24*(2), 291–326. doi:10.1017/S1365100518000226

Amest, J., & Claro, S. (2021). Effects of apprenticeship on the short-term educational outcomes of vocational high-school students. *Journal of Research on Educational Effectiveness*, *14*(3), 598–616.

Baker, W. (2000). *Achieving Success Through Social Capital: Tapping Hidden Resources in Your Personal and Business Networks*. Jossey-Bass.

Baldwin, T., & Ford, J.K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology*, *41*(1), 63–105.

Binder, J., Baguley, T., Crook, C., & Miller, F. (2014). The academic value of internships: Benefits across disciplines and student backgrounds. *Contemporary Educational Psychology*, *41*. DOI:10.1016/j.cedpsych.2014.12.001.

Burnette, J.L., Pollack, J.M., Forsyth, R.B., Hoyt, C.L., Babij, A.D., Thomas, F.N., & Coy, A.E. (2020). A growth mindset intervention: Enhancing students' entrepreneurial self-efficacy and career development. *Entrepreneurship Theory and Practice*, *44*(5), 878–908. https://doi.org/10.1177/1042258719864293

Deprez, J., Peeters, E.R., & Gorgievski, M.J. (2021). Developing intrapreneurial self-efficacy through internships-Investigating agency and structure factors. *International Journal of Entrepreneurial Behavior & Research*, *27*(5), 1166–1188. https://doi.org/10.1108/IJEBR-09-2020-0642

Fall, F. (2013). Endogenous persistent occupations and inequality. *Journal of Public Economic Theory*, *15*, 292–318. https://doi.org/10.1111/jpet.12019

Fiet, J. (2001). The Pedagogical Side of Entrepreneurship Theory. *Journal of Business Venturing*, *16*(2), 101–117.

Holland, D., Lachicotte, W., Jr., Skinner, D., & Cain, C. (2001). *Identity and agency in cultural worlds*. Harvard University Press.

Hora, M.T., Wolfgram, M., & Thompson, S. (2017). *Research Brief #2: What Do We Know About the Impact of Internships on Student Outcomes? Results from a Preliminary Review of the Scholarly and Practitioner Literatures*. Center for Research on College-Workforce Transitions, University of Wisconsin-Madison, September 2017.

Kuh, G. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Washington, DC: Association of American Colleges and Universities.

Lent, R.W., Brown, S.D., & Hackett, G., (1994). Toward a unifying social cognitive theory of career and academic interest, choice and performance. *Journal of Vocational Behaviour*, *45*, 79–112.

Main, J.B., Johnson, B.N., & Wang, Y. (2019). Gatekeepers of engineering workforce diversity: The academic and employment returns to student participation in voluntary cooperative education programs. *Research in Higher Education*, *62*, 448–477.

Martin, B., McNally, J., & Kay, M. (2013). Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes. *Journal of Business Venturing*, *28*(2), 211–224.

Mcfeely, S., & Wigert, B. (2019). This Fixable Problem Costs U.S. Businesses $1 Trillion. *Gallup*. Retrieved from https://www.gallup.com/workplace/247391/fixable-problem-costs-businesses-trillion.aspx

NACE. (2021). *Job Outlook 2021 Spring Update, National Association of Colleges and Employers.*

NACE. (2021). *Intern Conversion Rate Climbs, Fueled by Jump in Offer Rate*. Retrieved from https://www.naceweb.org/talent-acquisition/internships/intern-conversion-rate-climbs-fueled-by-jump-in-offer-rate/?utm_source=twitter&utm_medium=social&utm_content=post-with-img&utm_campaign=content

NAE [National Academy of Engineering]. (2020). *President's statement on the NAE's commitment to diversity, equity, and inclusion, Jun 19.* Washington.

Neck, H., & Greene, P. (2011). Entrepreneurship education: Known worlds and new frontiers. *Journal of Small Business Management*, *49*(1), 55–70.

Neyt, B., Verhaest, D., & Baert, S. (2020). The impact of dual apprenticeship programmes on early labour market outcomes: A dynamic approach. *Economics of Education Review*, *78*, 1–21.

O'Neill, N. (2010). Internships as a high-impact practice: Some reflections on quality. *Peer Review*, *12*(4), pp. 4+. Retrieved from Gale Academic OneFile, link.gale.com/apps/doc/A245740014/AONE?u=anon~768788c1&sid=googleScholar&xid=50418113.

Piróg, D., Kilar, W., & Rettinger, R. (2021, October 27). Self-assessment of competences and their impact on the perceived chances for a successful university-to-work transition: the example of tourism degree students in Poland. *Tert Educ Manag*, *27*(4), 367–84. DOI: 10.1007/s11233-021-09081-5. PMCID: PMC8549601.

Torpey-Saboe, N., Leigh, E.W., & Clayton, D. (2022). *The power of work-based learning*. Strada Education Foundation. Retrieved from https://stradaeducation.org/wp-content/uploads/2022/03/031522-PV-report.pdf

Unger, J., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta analytical review. *Journal of Business Venturing*, *26*(3), 341–358.

van Praag, M., & Versloot, P. (2007). *What is the value of entrepreneurship? A review of recent research*. IZA Discussion Paper No. 3014. Jena Economic Research Paper No. 2007-061.

van Stel, A., Carree, M., & Thurik, R. (2005). The effect of entrepreneurial activity on national economic growth. *Small Business Economics*, *24*(3), 311–321.

Walter, O., Shenaar-Golan, V., & Greenberg, Z. (2015). Effect of short-term intervention program on academic self-efficacy in higher education. *Psychology*, *6*(10), 1199–1215. https://doi.org/10.4236/psych.2015.610118

Wardana, L.W., Narmaditya, B.S., Wibowo, A., Mahendra, A.M., Wibowo, N.A., Harwida, G., & Rohman, A.N. (2020). The impact of entrepreneurship education and students' entrepreneurial mindset: The mediating role of attitude and self-efficacy. *Heliyon*, *6*(9), e04922. doi:10.1016/j.heliyon.2020.e04922. PMID: 32995616; PMCID: PMC7502346.