CAUCE RESEARCH REPORT: THE EMPLOYMENT OUTCOMES OF PYTHON UPSKILLING

- Research conducted between January 2023 and April 2024.
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Objectives

The objectives of this study are to:

- Compare the employment outcomes of individuals who have completed upskilling programs through bootcamps, digital badges, certificates, micro credentials.
- Evaluate the factors that contribute to the effectiveness of these upskilling programs in terms of improving employment outcomes.
- Identify the barriers that prevent individuals from accessing and completing upskilling programs in Python programming.

Summary of key literature

In recent years, the landscape of non-credit education and employment has significantly shifted, with microcredentials becoming an increasingly popular form of upskilling. These programs have gained attention within higher education, especially since the pandemic. By 2021, nearly half of US workers reported earning some form of alternative credential (SHRM, 2022). Institutions offering non-credit credentials such as certificates, bootcamps, and badges have become more prevalent, with a significant portion of these credentials being stackable (UPCEA, December 2023).

The rise of various forms of upskilling is being driven by various factors. Universities need to adapt to changing demands or risk declining enrolment and revenue. Predictions suggest that higher education will be shaped more by employers, emphasizing competencies, content needs, and flexible education models (Fong, 2023). Employers are increasingly hiring based on skills rather than degrees, enhancing the marketability of alternative credentials. McKinsey reports that hiring for skills is far more predictive of job performance than hiring based on education or work experience (Hancock et al., 2022). Microcredentials are often more focused on building specific skills and digital badges serve as proof of skill attainment.

Learners pursuing microcredentials are typically university or college graduates seeking to enhance their degrees or learn specific work-related skills. These individuals are often full-time professionals with median or high incomes (Pichette, 2024). Understanding learner motivations and preferences is crucial for designing effective upskilling programs. A 2021 poll by Emeritus showed a preference for shorter, blended learning formats.

Barriers to accessing and completing upskilling programs include affordability, lack of awareness, and time constraints due to work or family obligations. These barriers persist despite the potential benefits of alternative credentials (Morning Consult, 2022; OECD, 2023).

While microcredentials can lead to short-term employment gains, their long-term value relative to traditional degrees is uncertain. Some studies show that stacking credentials can lead to higher earnings, especially when combined with traditional degrees (Daugherty, 2023). There is a need for improved tracking and reporting to understand the long-term impact of upskilling (OECD, 2023). Employers' views on alternative credentials vary. While some see the potential for improving workplace diversity and performance, others are skeptical about the quality and relevance of these credentials. Collaboration between educational institutions and industries can enhance the credibility and effectiveness of upskilling programs (SHRM, 2022; Capranos, 2023).

Methodology

The study employed a mixed-methods approach, combining both qualitative and quantitative research methods. The study population consisted of individuals who have completed upskilling programs in python programming, regardless of the type of program or provider. The study concentrated on a single learning topic to maintain consistency, choosing Python due to its widespread popularity and the availability of upskilling programs in the various formats studied.

The data collection methods included:
1) **Secondary research and literature review**, including a review of 50 job postings looking for python programmers.
2) **A self-administered online survey**: conducted in Qualtrics. The completion of the survey was incentivizing using gift cards. Responses were filtered for duplicates, validity, eligibility and bots, bringing the response quality score in Qualtrics to 98%. There were 224 responses to the survey after filtering.
3) **Semi-structured interviews:** for the qualitative component of the study, we selected individuals who had participated in the Qualtrics survey and who had indicated willingness to participate further in the study. 22 informational interviews were conducted with learners. We also expanded the scope of the study slightly by speaking with employers or hiring managers/recruiters about what they look for when hiring for python programmers. A total of 26 informational interviews were held online, via Teams. All participants consented to the use of recording and for the use of anonymous quotations to be published in this study.

Summary of survey results

A significant portion of the respondents (38%) completed their programs within one to three months, and the majority (53%) did so on a part-time basis. This suggests a preference or need for flexible, short training options that can be balanced with other personal and professional responsibilities. The training costs varied, but most were in the range of $100 to $1000, indicating a moderate financial commitment to upskilling. Despite the availability of free resources, only a few participants opted for free training, highlighting possible issues with the perceived value of such resources. Time and financial constraints were the most significant barriers, affecting 31% and 28% of respondents, respectively. This underscores the need for more accessible, time-efficient, and cost-effective training solutions.

A troubling insight is that over 30% of respondents felt they gained skills they haven't yet applied, and 13% felt underprepared for practical Python application. This suggests a gap between training content and real-world applicability. While only 10% of participants had applied their skills in their current roles, 15% transitioned to new career paths, indicating some degree of success in career mobility facilitated by the training.

In terms of career supports within the upskilling programs, job placement assistance and mock interviews were common, but their effectiveness varied, suggesting potential areas for improvement in aligning support services more closely with job market needs. There was generally a high level of satisfaction with employment outcomes among those who benefited, although the survey suggests mixed results on how transformative these programs were for many participants.

Certificate programs and traditional courses were more likely to be taken from academic providers, suggesting a strong academic inclination for more structured and formally recognized forms of upskilling. Conversely, bootcamps, typically known for intensive, practical training, were less commonly associated with academic institutions. The effectiveness of career supports varied significantly across program types, with bootcamps reportedly offering substantial supports but receiving lower effectiveness ratings. This could suggest that while bootcamps are well-intentioned in providing career assistance, the quality or relevance of this support may not meet participant expectations or needs.

'Certificates' were typically longer in duration, often extending beyond six months, which aligns with their formal nature and the depth of learning typically associated with them. Interestingly, digital badges, expected to be short, also showed a tendency for longer durations, which might indicate a misunderstanding or misclassification by respondents. True to their name, microcredentials were more often completed within a one to three-month span, supporting their role as short, targeted upskilling options.

Older participants were more likely to invest in higher-priced training, potentially due to greater financial resources or a more targeted career investment strategy. This indicates that older age groups may view upskilling as a significant career development move, investing accordingly. Individuals with higher educational backgrounds (master's or doctorate) were more inclined to choose academic institutions for upskilling, likely reflecting a preference for or trust in formal educational structures.

Despite some participants gaining skills, many found it challenging to apply these practically. The study suggests enhancing practical components in training programs to improve their real-world applicability and effectiveness. Overall, while the survey points to a generally positive reception of python training programs, there remains significant room for improvement in terms of practical skill application, cost accessibility, and tailored career support.

In this study, we also utilized the crosstabs tool in Qualtrics to perform multivariate analysis on the survey results. This method is particularly effective in revealing trends and patterns that might not be obvious when analyzing individual questions. Certificates and courses were predominantly taken from academic providers, whereas microcredentials were more evenly split between academic and non-academic providers. Bootcamps were less likely to be associated with academic institutions. Certificates emerged as the most expensive option, contrary to the expectation that bootcamps would be pricier. Microcredentials, courses, and digital badges exhibited significant pricing variability.

The most frequent age range for participants was 25-34. Younger participants, particularly those aged 18-24, tended to complete microcredentials, workshops, or digital badges, likely due to familiarity with the terminology. Older participants, specifically those aged 55-64, predominantly completed certificates.

There was a significant correlation between program cost and participant age, with older participants spending more on training, likely due to higher salaries and employer support. Higher education levels also correlated with higher training costs and a preference for academic institutions. In terms of outcomes, participants with college diplomas or bachelor’s degrees were more likely to use their upskilling for career advancement or transitions. Those with master’s or doctorate degrees often used their new skills in their current roles or reported not gaining enough practical knowledge to be able to code in python.

Bootcamp participants often faced financial barriers, while time was a significant issue for course participants. Survey participants who completed microcredentials and digital badges were less likely to face financial barriers, but often lacked the time needed for completion. Career supports, when provided, were most frequently job placement assistance and mock interviews, with bootcamps offering the highest level of support.

The analysis of program outcomes highlighted that certificates often led to gaining new, yet unutilized, skills. Bootcamps were effective in expanding professional networks and facilitating career transitions. Microcredentials and digital badges had mixed results, with some participants not gaining sufficient practical knowledge. Participants rated their confidence in Python programming skills post-program, averaging 6.6 out of 10. Confidence levels were consistent across different programs, with a slight increase for programs lasting over three months. Academic providers instilled more confidence in participants than non-academic providers. Additionally, higher program costs and higher education levels were associated with greater confidence in Python skills. Younger participants, particularly those aged 18-24, were more confident in their skills compared to older participants.

Summary of informational interview findings

Informational interviews were then conducted with survey participants who indicated a willingness to participate further. The interviews revealed a wide range of motivations behind participants' pursuit of upskilling in Python, encompassing both personal and professional goals. Participants engaged in upskilling for various reasons, including the desire to stay current with technological advancements, specifically in managing large data sets and enhancing their skills in data science. For some, upskilling served as a means to future-proof their careers, while others saw it as an opportunity to make themselves more marketable and relevant in the job market. Upskilling choices varied significantly, with some learners opting for structured academic programs due to their recognized value, while others chose more

flexible, non-academic courses that could be completed at their own pace. This flexibility was particularly valued by those needing to balance learning with professional commitments or personal circumstances.

Several participants noted the importance of the reputation and recognition of the institution or platform offering the upskilling, indicating a preference for credentials from well-known educational entities. They believed that these credentials carried more weight in the job market, especially when compared to courses from lesser-known providers. There was also a recurring theme of the practical application of python skills, with some participants feeling well-prepared to apply their new skills in the workplace, while others felt the need for further practice and real-world application to feel confident in their capabilities. Overall, the interviews highlighted the diverse and complex factors influencing individuals' decisions to pursue upskilling, including the perceived value of different types of credentials, the balance of theory versus practical application in course content, and the impact of these factors on their career advancement and job market opportunities.

The scope of the study was then expanded slightly to include informational interviews with hiring managers, an HR representative and a recruiter. Universally, employers emphasized less concern for educational background or certifications and more focus on practical skills, specifically the ability to contextualize work displayed on resumes and articulate thought processes and problem-solving strategies during interviews. The employers consistently expressed valuing candidates who could discuss their work and decisions in depth, indicating that real understanding and experience are more critical than formal credentials. They also noted that while bootcamps could indicate a candidate's determination and ability to handle rigorous learning, they often did not provide deep retention of knowledge due to their fast pace and predefined project scopes.

Furthermore, the employers interviewed expressed that they often disregard educational background in favor of demonstrated skill, especially practical coding ability shown through take-home tests or coding challenges rather than formal education or certificates. Some hiring managers expressed skepticism about the real-world utility of bootcamps and digital badges, suggesting that these credentials often fail to ensure deep foundational knowledge or problem-solving ability expected in professional settings. However, there was recognition that bootcamps might signal a candidate's grit and determination to switch careers, which can be valuable traits.

Overall, the discussions highlighted that while traditional credentials like degrees still hold some value, the ability to demonstrate relevant, practical skills and a proactive learning attitude is paramount even over degree completion.

Key impacts on continuing education

Without standardization in the use of these terms (badges, microcredentials) learners do not have a clear idea of what they mean or how to categorize their training. Often the categorization of programs doesn’t matter to learners at all, particularly in technical courses where they are looking to build a specific skill. In fact, listing the skill alone is often seen are more beneficial than listing the certificate. The important outcome for learners is gaining confidence in the skill itself, the ability to pass the technical tests, reach the interview stage, develop a portfolio on GitHub and being able to talk through their approach to coding and projects.

The employment outcomes associated with different upskilling formats varied, with some participants reporting significant career progression while others felt underprepared for practical applications of their new skills. This inconsistency underscores the need for upskilling programs to include hands-on, real-world components that align with industry needs.

Employer perspectives gathered through interviews reveal a preference for practical skills and project-based experience over formal credentials, though recognizable names of educational institutions and involved industry partners can enhance the credibility of upskilling programs. Both learners and employers are generally more trusting of upskilling programs from academic providers, and the reputation of the institution in that training area does matter. For continuing education units that means continue to leverage the strength of your institutions and what they are known for.

It was clear that bootcamps have a divisive reputation. Continuing education departments considering building bootcamps or leveraging third party providers should be aware of the mixed perceptions of bootcamps and potentially tread with caution. Surprisingly, employers are also distrustful of digital badges which runs counter to their intent.

Addressing financial and time barriers through more flexible program schedules, varied delivery methods (online, hybrid), and scalable pricing models can make upskilling more accessible. The greatest barriers to training were cost and time, learners were looking for shorter courses that they could fit into their busy schedules however often very short courses were too surface level for them to develop the confidence to add this as a skill on their resume. There seemed to be a 'sweet spot' for programs over three-months duration (part-time) being comprehensive enough to result in increased confidence in python skills.

Enhancing career support services to better match training with actual job market demands could improve employment outcomes and satisfaction levels. We cannot have a one size fits all approach to training programs, it is vital to really need to understand what the needs of the target audience are; is it a short introductory course to understand the basics, use of a specific library or type of analysis in python (such as linear regression) or is it a comprehensive course to become a programmer? Then course information must clearly state the learning outcomes and target audience to ensure alignment.

Conclusion

Upskilling through microcredentials is becoming increasingly popular, driven by both learner demand and employer needs. Barriers to accessing upskilling programs include financial costs and time constraints, despite the perceived lower barriers of microcredentials and digital badges. Notably, the study identifies a lack of consistency in the long-term value of these credentials compared to traditional degrees, with upskilling sometimes leading to immediate employment benefits but not consistently resulting in long-term career advancement. The employment outcomes associated with different upskilling formats varied, with some participants reporting significant career progression while others felt underprepared for practical applications of their new skills. This inconsistency underscores the need for upskilling programs to include hands-on, practical components that align with industry needs.

Employer perspectives gathered through interviews reveal a preference for practical skills and real-world experience over formal credentials, though recognizable names of educational institutions and involved industry partners can enhance the credibility of upskilling programs. There is a critical need for more practically oriented training programs that directly address real-world applications of Python. This includes integrating project-based learning, real-time programming environments, and interactive learning modules.

In conclusion, the report suggests that while upskilling and alternative credentials offer pathways to employment, their value in the job market remains varied. Effective upskilling programs should align closely with industry demands, provide practical skills, and address the barriers of time and cost to maximize their impact on employment outcomes. While these credentials offer promising opportunities, particularly in specific fields like technology, challenges such as affordability, awareness, and credibility remain. There is a need for further research and improved tracking to fully understand the long-term impact and best practices for integrating these credentials with traditional education pathways.

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