Employer Perspectives on Graduate Readiness in the Age of AI

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Abstract

This research-to-practice WIP paper examines the evolving demands of the computing workplace in the age of artificial intelligence (AI). It highlights both the need to be AI-aware and the critical integration of technical and interpersonal competencies.

The study draws on an employer survey conducted with organizations that commonly hire University Computing graduates. Respondents included team leads, project managers, and development managers from software firms and consultancies in the Indianapolis area.

Survey questions explored three main areas: The current and anticipated use of AI in the workplace, the changing role of software developers as AI reshapes the industry, and the importance of analytical and soft skills in software development firms.

The ultimate goal of this research is to inform the design of undergraduate Applied Computing courses in software engineering. We address 2 key questions:

1) How are employer expectations for computing graduates evolving in response to the increasing integration of artificial intelligence across industries?
2) What strategies can educational institutions adopt to align computing curricula with industry demands for technical acumen, AI fluency, ethical awareness, and collaborative integration?

Using survey data, both quantitative and qualitative, the research reveals key insights: There is widespread, but not 100%, adoption of AI technologies across software development companies; There is a strong concurrent need for robust interpersonal and business skills; There is a need for our graduates to use modern tooling, including AI, effectively, to enhance productivity; Employers value analytical skills, the ability to synthesize customer requirements and to critically evaluate AI generated content.

These findings underscore the importance of preparing students not only with technical acumen and AI proficiency but also with the soft skills required to navigate complex, collaborative professional environments. The paper proposes educational strategies to bridge this gap, supporting graduates to meet contemporary workforce expectations.

We are conducting this study to better understand how academic preparation can more effectively support students' transition into professional software development, given the rapid rise of AI. Our motivation is to ensure that coursework reflects industry relevant expectations while also strengthening engagement and persistence through effective learning strategies. Unlike studies that focus narrowly on workforce readiness or short-term classroom outcomes, this research brings together four dimensions that are rarely examined in combination: students' technical preparedness, their ability to use AI effectively and responsibly, the cultivation of genuine passion for software development, and the soft skills essential for success in modern business

environments. By integrating these elements across an entire semester, the study offers a more complete and practice aligned understanding of how students develop the competencies, mindsets, and professional habits needed to thrive in an AI driven software industry.

Introduction

The rapid expansion of artificial intelligence (AI) is reshaping industries and accelerating the need for engineers who can adapt to an AI-driven workplace. As AI automates routine work, employers now expect graduates who can use AI effectively and combine technical skill, critical judgment of AI output, and strong interpersonal and business capabilities.

Job postings requiring AI skills grew from 0.5% in 2010 to 1.7% in 2024—over 628,000 postings nationwide [1]. High-growth, high-wage computing and AI-related roles overwhelmingly require at least a bachelor's degree [10], and Pew Research shows that AI-exposed jobs rely heavily on analytical skills [12]. Yet early-career workers in these roles are experiencing employment declines [15], underscoring the need for graduates who can adapt as job requirements evolve.

This study examines employer expectations to clarify how engineering education can better prepare students for these shifting demands. Using employer survey data, it identifies trends in AI adoption, evolving workforce needs, and gaps between academic preparation and industry expectations. Its contribution lies in analyzing the holistic combination of three domains: traditional technical competencies, the ability to critically assess and work alongside emerging AI tools, and the interpersonal and business skills required as software development becomes more collaborative and extends beyond coding alone. These insights inform strategies to help information technology graduates develop a comprehensive skill set suited to an AI-shaped workplace.

Literature Review

As AI adoption accelerates, researchers have examined how AI is reshaping workforce expectations and the competencies required of computing graduates. National labor reports document the rising prevalence of AI related skills in job postings [1,10], and academic literature extends this discussion by exploring how these shifts influence the nature of work and the preparation needed for early career professionals. Pew Research, for example, highlights that AI exposed occupations rely heavily on analytical reasoning and are undergoing structural changes that disproportionately affect early career workers [12,15]. These findings reinforce the need for graduates who can adapt to evolving job demands rather than rely solely on static technical knowledge.

Beyond technical proficiency, employer focused studies emphasize the importance of human-centered competencies. The National Association of Colleges and Employers (NACE) identifies

problem-solving, teamwork, communication, and adaptability as decisive hiring attributes for early career candidates [4]. Research on Agile practices further illustrates how communication and collaboration shape workplace effectiveness; Riedl et al. [14] show that Agile methods improve job satisfaction partly *because* they depend on interpersonal coordination and responsiveness. These studies collectively suggest that soft skills are not peripheral but central to success in modern software development environments.

Scholars have also documented persistent gaps between academic preparation and industry expectations. Zhou et al. [2] report that graduates often struggle with professional communication, digital identity management, ethical awareness, and remote collaboration — areas increasingly relevant as workplaces integrate advanced technologies and AI. Similarly, Sabariah et al. [3] and Radermacher and Walia [6] find that software engineering curricula frequently emphasize theoretical foundations at the expense of practical, workplace relevant competencies, leaving graduates underprepared for contemporary development practices. These gaps point to the need for more experiential, industry aligned learning opportunities.

AI literacy has emerged as a parallel area of concern. The OECD's AI Literacy Framework outlines foundational knowledge young people should possess — including understanding how AI systems work, how they use data, and how to critically engage with AI outputs [7]. Complementary analyses, such as the OECD's Bridging the AI Skills Gap report [8], argue that AI related learning must extend beyond specialist programs and be integrated across educational pathways. Industry initiatives echo this emphasis: Microsoft's Elevate program, for example, frames AI readiness as a people centered effort requiring broad based digital and analytical competencies [9].

Taken together, the literature demonstrates a growing consensus that computing graduates require a blend of technical skills, AI related analytical abilities, and human-centered soft skills to thrive in modern workplaces. However, existing research often examines these domains separately — focusing on AI literacy, soft skills, or technical preparation in isolation. This fragmentation offers limited insight into how these competencies intersect in practice. Addressing this gap, the present study investigates how employers conceptualize the combined skill profile needed for contemporary software development roles and how well current educational pathways prepare students for this evolving landscape.

Methodology

This study used a survey based, mixed methods approach to examine employer perspectives on AI adoption and workforce expectations for computing graduates. Participants were typical employers of university graduates—primarily software development firms and consultancies in the Indianapolis area—who serve on an industry advisory panel that provides feedback on curriculum relevance and student opportunities. Ten industry professionals participated in the anonymized study.

Participants represented a range of roles within the software development ecosystem, including three software engineers, two technical leads, three project managers, and two chief technical officers, one of whom founded his company. They work across small, medium, and large organizations, with company sizes ranging from fewer than 50 employees to more than 5,000. The sample included individuals from both technology focused companies and organizations in other sectors that maintain internal software development teams. Although the sample size is modest, this diversity in role, industry, and organizational scale provides a broad view of employer expectations and supports the study's aim of identifying the combined technical, AI related, and interpersonal skills valued in contemporary software development environments.

The survey instrument was developed by the PI, drawing on industry experience and years of teaching in computing and technical education. Questions were designed to capture both quantitative and qualitative insights. Closed ended items (e.g., Likert scale ratings) quantified employer priorities and beliefs, such as the use of AI to manage legacy code bases and expectations for future job availability for software developers in the age of AI. Open-ended questions solicited detailed feedback on desired skill sets, work ethic, and approaches to problem solving. The survey focused on AI adoption, the evolving role of software developers, the importance of analytical and interpersonal skills, and the ability to critically evaluate AI generated content.

Surveys were distributed electronically, and responses were collected over a six week period. Quantitative responses were analyzed using descriptive statistics to identify patterns in AI adoption and skill requirements. Qualitative feedback was examined thematically, revealing recurring concerns, priorities, and expectations that employers hold for new graduates entering software development roles.

Results

The survey results provide valuable insights into employer expectations for engineering graduates, specifically within the domain of software development, amidst a sharp rise in demand for AI competency. The responses and feedback allow for meaningful analysis of trends in AI adoption, and the importance of technical preparation, interpersonal skills, and business acumen within the software development field. In alignment with Zhou [2], these findings form the foundation for addressing gaps in educational preparation, and proposing strategies to connect academic outcomes more directly to industry demands.

Most respondents (70%) stated that they use AI to assist in the software development process, with 30% of companies included in the survey, using a proprietary AI engine. Of note, 30% of respondents indicated that they did not use AI. This shows strong adoption of AI, but suggests that barriers still exist.

The survey results can be categorized into two main areas: **workforce and professional competencies**, and **impact of AI**.

Workforce Readiness, Professional Competencies

Respondents were asked about resources their software developers rely on, metrics based on the PI's experience as a developer.

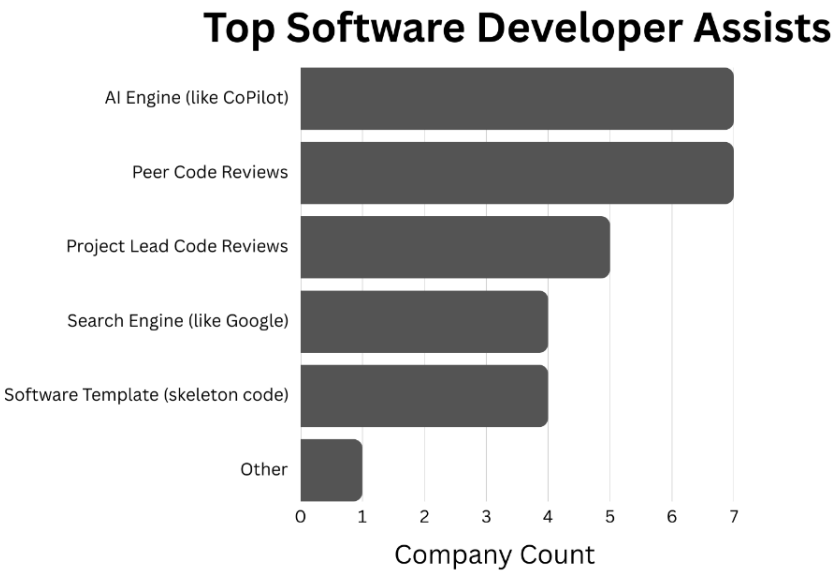

Figure 1

Employers emphasized the importance of AI tools and code reviews, identifying them as influential practices, shown in Figure 1. Longstanding resources such as software development templates and internet searches continue to play a central role in development. In addition, the Agile methodology was deemed a valuable framework that supports collaboration and efficiency in software development, in line with the findings of Riedl et Al [14].

Employers emphasized that success is not solely dependent on AI tools; companies rely on established protocols like peer reviews, standards, and well-defined team hierarchies to guide their processes. Team members are expected to adhere to organizational protocols, making use of company-developed templates and strategies as they build or maintain software products, ensuring consistency and reliability. This is in keeping with NACE 2024 [4], which underscores professionalism and collaboration.

These findings point to curricular opportunities. Software engineering courses could integrate industry aligned coding standards, template driven development, and instruction in Agile, consistent with the recommendations of Sabariah et al. [3].

Embedding code review exercises and protocol-driven projects into coursework would mirror workplace expectations, while case studies could demonstrate how AI tools complement, rather than replace, established processes. Blending technical instruction with exposure to organizational structures and collaborative workflows, would better prepare students to transition into professional software development environments.

Tech companies are increasingly investing in large-scale AI education initiatives designed to expand digital skills and support workforce development. Programs like Microsoft *Elevate* [9] provide structured AI learning resources, tools and micro-credentials, that can be integrated into curricula to enhance teaching and further align coursework with current industry needs.

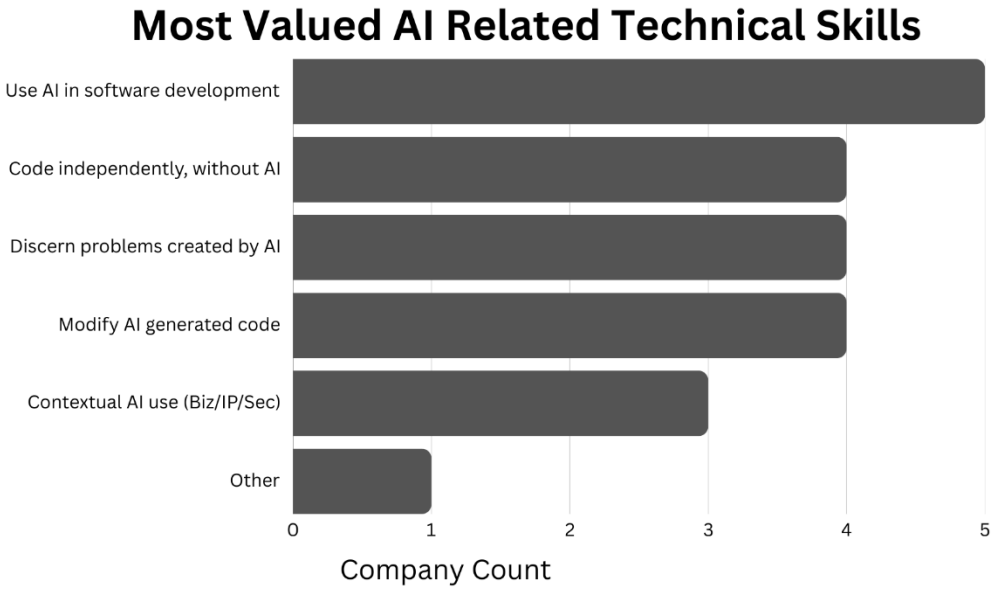

Figure 2

Respondents were asked to indicate three top technical skills, specifically related to AI. Results in Figure 2 reveal the importance of being able to use AI effectively as a tool and to critically validate AI generated outputs. This aligns with the OECD's emphasis on understanding how AI systems use data and produce outputs, and on engaging with AI critically [7].

The transition from college to career is an important one. A successful first couple of weeks in a new job can set the stage for success. With this in mind, respondents were asked about typical onboarding activities. CBTs (Computer-Based Training), peer mentoring and exposure to customer requirements all featured in the written feedback.

"CBTs, interviews with existing staff, introduction to common issues, and exposure to customer communications"

"We use peer mentoring to on board new developers. they are expected to take and run independently with small task in the first three months. We also offer many recorded videos about the product and product architecture"

"Three days of virtual onboarding initially, then onto working with an HR team and managers to get new hires onto projects, design development goals, and through the first year of employment"

Given common employer onboarding practices (like computer based training modules, peer mentoring, customer facing communication, and recorded instructional videos) colleges can better prepare students by incorporating peer mentoring, debugging and ad hoc coding projects for analysis and implementation, and using self paced digital learning modules to mirror onboarding experiences.

Many software development organizations maintain legacy applications (older software applications, still in use). Indeed, it is likely that new hires will work on existing code before being assigned to develop new content.

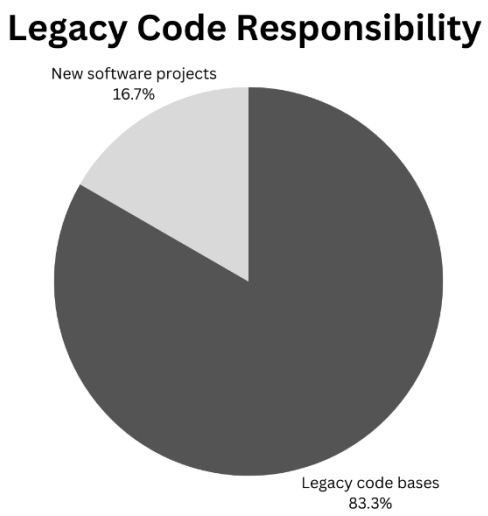

Figure 3

Most (83%) had responsibility for legacy code, and 100% of these stated that AI was ineffective in helping maintain this important part of the software development industry. Legacy code is less open to modern AI engines, given that the language and development methodology may have preceded LLMs (Large Language Models) in use today. This finding, shown in Figure 3, emphasizes mastery of traditional coding constructs:- logic, code analysis and debugging. This skill set will prepare students to independently maintain existing code.

While universities continue to offer technical degree programs that prepare software developers, the rise of AI demands a new set of skills. Respondents were asked to reflect on the evolving role of software developers, represented in Figure 4. More than two-thirds of companies state that coding is now only *part of* the developer role.

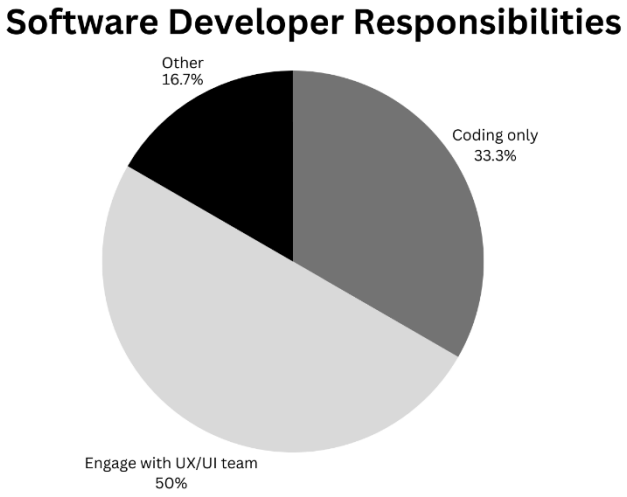

Figure 4

AI systems generate code, and respondents also rated AI as highly supportive in UX/UI design. 67% of respondents reported using AI to analyze requirements and produce task lists. It is clear that developers will need a broader skillset that reaches into adjacent areas. This reflects findings from the Stanford Digital Economy Lab [15] that AI increases the value of integrative human capabilities.

Feedback emphasized the importance of developing effective AI prompts to obtain reliable outputs, as well as skills in agent orchestration to manage AI systems within complex workflows.

These responses reinforce the view of AI as a tool that augments, rather than replaces, the developer's role. Employer reflections included:

"We will still need good developers. They will need to understand the overall full scale of the software product which is currently a short fall of the AI models. The AI model is expected to help them become more productive"

"We are a human centered tech enabled firm so AI is used as an assistant, but we will not be fully dependent on AI"

Other responses envision software developers in the role of designers or managers, somewhat removed from the coding process, and using AI as a tool.

"Software developers will work more in a distributed toolset environment that will require prompting for code outcomes versus developing lines of code. Relying less on coding knowledge vs. understanding the usage and outcomes"

"Using AI as an engine to generate code is one side of the equation…. Productivity of software developer will increase however from a job requirement standpoint, their role will also include product management"

AI is pushing computing to value a broader set of skills beyond the purely technical, underscoring the need to build these capacities through applied, collaborative learning experiences.

Participants identified the top three soft skills they expect from graduates, and Figure 5 shows a clear preference for well-rounded candidates with strong interpersonal skills, innovative thinking, communication ability, and effective teamwork under leadership.

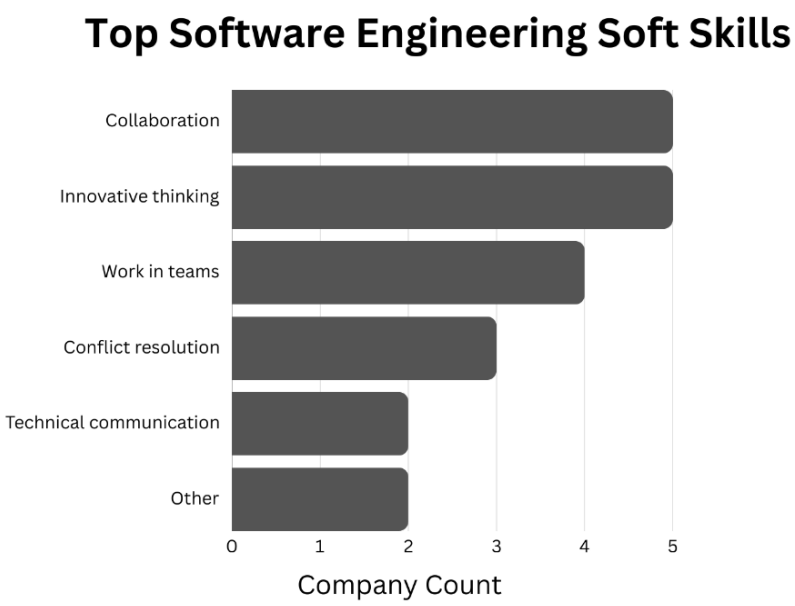

Figure 5

Echoing these soft skills, Radermacher and Walia [6] point to teamwork and communication as among the most frequently cited deficiencies in new graduates. Embedding opportunities to practice communication, goalsetting, and self management within coursework can help strengthen these aptitudes. This aligns with the career readiness expectations outlined by NACE [4] and Pew Research [12].

One employer pointed to passion for the industry, an important concept for consideration!

"During the interview process, we are trying to identify passion. Passion for software engineering and technology, helps the developers to be better at what they do"

Open-response feedback indicates that employers increasingly want innovative developers who can use AI effectively, including emerging practices like agent orchestration, where multiple AI agents coordinate to automate complex workflows. As these capabilities grow, the priority for colleges is to help students adapt, learn new technologies, and design creative, efficient solutions, rather than master every new tool. Industry engagement—through rotations, project partnerships, or ad-hoc development work—remains central to developing these skills.

Survey responses highlight employers' emphasis on collaboration, consistent with Xiao et al.'s longitudinal findings on teamwork in AI-enabled development [13]. They also stressed the importance of handling code-review feedback constructively and following team protocols, expectations reinforced in Agile settings and aligned with Riedl et al. [14]. Universities should design curricula that reflect structured, team-based professional environments, giving students experience with timelines, clear communication, defined roles, and delivering software as part of a coordinated effort that meets client or organizational needs.

Employers emphasized the importance of genuine passion for the field. This raises the question of how programs can help students develop and demonstrate that passion. One effective approach is to connect coursework to students' interests and show how computing can serve as a medium for creativity and contribute to the common good. This aligns with Self-Determination Theory (SDT) [5], which highlights autonomy, competence, and relatedness as drivers of intrinsic motivation. Embedding these principles into course design can help students build technical skills and cultivate a more enduring commitment to software development.

Direct Impact, AI

AI is affecting productivity and, in turn, the demand for software developers, but concerns remain. In an optional survey item on AI's overall impact, respondents described widespread adoption across their companies, noted its usefulness for starting projects, and stressed the need to verify AI-generated content and catch errors. Employer reflections included

"*Still too many errors to trust AI"*

"It has reduced cognitive load when writing code. We still find that AI makes mistakes and human review is required (not blindly trusting the result) but we've found it is generally easier to review a mostly correct piece of code than to handcraft the same code. Finding the AI tools are particularly useful as people jump between project domains and coding languages"

"The majority of software developed is for maintenance or small features. LLM and the ability to ask the LLM to create a code base for a specific spec, becomes a prompt engineering challenge. So we expect developers jump start their code using Co-pilot and such and then continue with the current devops methodology"

"AI has transformed the software development process, streamlining workflows, enhancing productivity, and pushing the boundaries of what's possible. The largest impact is in code generation and assistance. Debugging and testing have also evolved as the toolsets have evolved - examples include debugging, testing, vulnerability prediction, and recommended fixes"

"It is used as an enhancement/guide but all code is human centered, tech enables. Everything is reviewed and tested by us"

Employers rated AI's positive impact on software development highly (4.0 on a 0–5 scale), while its negative impact received a much lower average score (1.43), indicating broad confidence in AI's benefits despite some caution. Follow-up responses clarified these reservations.

AI's effect on productivity was especially strong: respondents rated its ability to increase developer productivity at 4.2, and comments noted that AI "reduces cognitive load and increases code production" and "enhances, rather than replaces, the role of the developer." One employer described the influence of AI on the developer role:

"Using AI as an 'engine' to generate code is one side of the equation, versus using AI that generates code for an app or program that technically becomes a product within the ecosystem. Productivity of software developer will increase however from a job requirement standpoint, their role will also include product management"

Respondents rated trust in AI-generated content at 2.7 on a 0–5 scale, indicating moderate skepticism, with higher trust likely among companies using their own AI systems. These results point to a need for developers who can critically evaluate AI outputs and recognize inaccuracies.

Concerns about workforce impact were also evident. When asked whether AI will affect the demand for software developers, responses were split: 67% believed demand will decline, while 33% expected no significant change. Figure 6 backs recent evidence showing declining employment in AI-exposed software roles and reinforces the need for graduates with balanced, adaptable skill sets to meet shifting industry demands. This is consistent with Stanford Digital

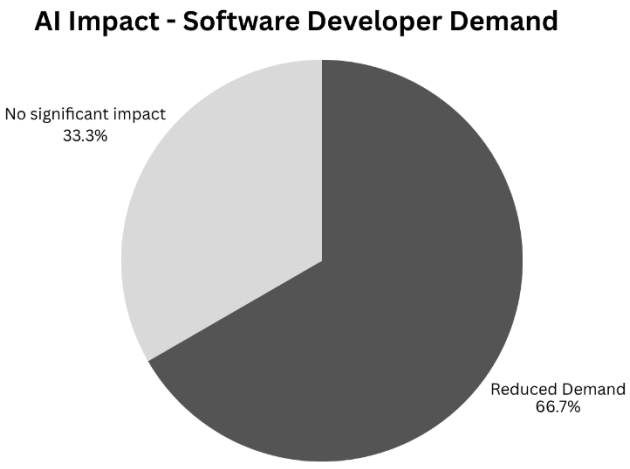

Figure 6

Economy Lab's *Canaries in the Coal Mine?* findings on early employment impacts of AI [15].

AI-generated content can introduce issues such as hallucinations, bias, and inconsistent reasoning. To assess these risks, participants were asked about top concerns with AI-generated code. As shown in Figure 7, respondents highlighted security vulnerabilities, unnecessary code bloat, over-reliance on AI by developers, and the risk of malicious content injection.

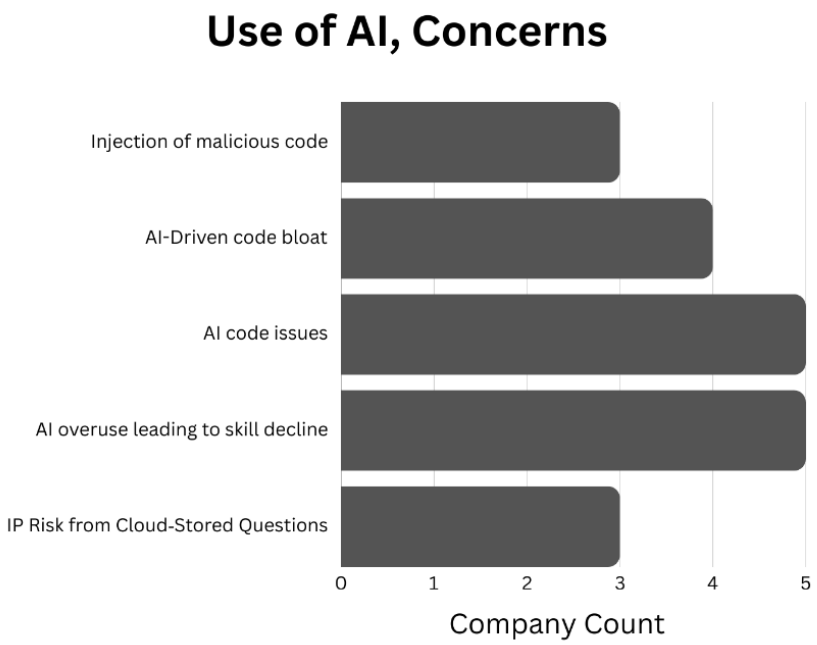

Figure 7

AI skepticism in the results highlights the need for engineers who can verify and problem-solve, treating AI output as *input* rather than a finished solution. Employers consistently viewed AI as a useful aid rather than a substitute for human judgment, emphasizing that AI-generated code must be tempered by human insight. Respondents also stressed the importance of strong collaboration skills and authentic passion for the field, noting that intrinsic motivation supports persistence and performance. These findings point to a workforce that must combine technical proficiency, critical engagement with AI tools, and interpersonal strengths. Students should graduate with mastery of software engineering both on and off the AI court. Table 1 summarizes these key themes and their implications for engineering education.

Table 1

Summary of Key Findings and Implications

Domain	Key Findings	Representative Evidence	Implications for Education
AI Adoption & Impact	AI widely used, viewed as beneficial. Strong perceived productivity gains, mixed trust in AI-generated content.	Positive impact rating: 4.0; productivity rating: 4.2; trust rating: 2.7.	Teach students to critically evaluate AI output, use AI as a tool not a substitute for judgment.
Risks & Concerns	Employers identify security vulnerabilities, code bloat, over-reliance on AI.	Survey items and qualitative comments highlighting risk categories.	Integrate secure coding, AI verification, and refactoring skills into coursework.
Workforce Trends	Demand for AI skills is rising, but early-career workers in AI-exposed roles face job volatility.	AI-skill job postings increased to 1.7% [1]; early-career declines noted [15].	Emphasize adaptability, analytical skills, and resilience in evolving job markets.
Interpersonal & Business Skills	Collaboration, communication, central to employer expectations.	Employer comments; alignment with Xiao et al. [13] and Riedl et al. [14].	Use team-based, industry-aligned projects to build communication and collaborative skills.
Intrinsic Motivation & Passion	Employers look for authentic passion for the field; intrinsic motivation supports persistence and performance.	SDT [5] highlights autonomy, competence, and relatedness as drivers of intrinsic motivation.	Design learning experiences that connect to student interests and foster intrinsic motivation.

Preliminary Implementation of Findings

Technical preparedness remains essential for IT graduates, but it becomes truly meaningful only when paired with the ability to navigate workplace processes, effectively incorporate modern tooling (such as AI), uphold professional integrity, collaborate effectively, and sustain a genuine passion for software development that motivates continuous learning and growth.

The PI has begun to translate the research outcomes into classroom practice, starting with the presentation of survey results to students. The PI has noted an increased level of engagement, with questions related to specific tooling and technology currently favored by surveyed

employers. AI has had a big impact on employer expectations. The PI has continued to integrate AI-based projects that require discernment of AI output, directing students to use course protocols or course-derived code, rather than that generated by AI. Effective onboarding tools, like self-paced tutorials, prepare new hires for long-term success. Educational research underscores the importance of allowing students to pursue their own motivations. The PI has created detailed technical tutorials for students to build key content at their own pace, followed by individual projects that enhance these skills and allow student expression of their own interests, in accordance with SDT [5]. The PI considers strategies for enhancing student engagement and hopes to demonstrate and subsequently foster, a passion for software development.

Employers want graduates who are passionate about their chosen field, because '*Passion for software engineering and technology, helps the developers to be better at what they do'.*

The graduate equipped with strong skills in software development, who has been trained to use AI as a tool, and who knows how to communicate clearly and effectively, is in a great position to succeed. We, as faculty, can help create this success by modeling our courses to incorporate mastery of critical software development skills, integrating industry input and practices and demonstrating professionalism within our departments, as well as passion for the content.

Limitations

This study provides insight into employer expectations for computing graduates, but several limitations should be noted. First, the sample size was modest, with ten participants drawn from organizations connected to a single regional advisory panel. While the group represented a range of roles, industries, and company sizes, the findings may not fully capture the breadth of employer perspectives across other geographic regions or sectors. Second, the study relied on self reported survey data, which may reflect individual perceptions rather than organizational policy or practice. Finally, because the survey focused on employers with existing ties to the university, participants may hold views that differ from employers who do not regularly engage with academic programs. These limitations suggest that future research could benefit from a larger and more diverse sample, additional data collection methods such as interviews or focus groups, and comparative studies across institutions or regions.

Future Work

Future work in this area should focus on curriculum mapping that enhances courses to better support employer needs identified in the survey, along with clear demonstrations of findings to both faculty and students. Strong industry collaboration is essential, directly associating course content with specific companies (industry partners), frameworks and modern tooling - to ensure the curriculum remains linked to current industry practices and technology, in line with recommendations of OECD [8]. This should be complemented by industry partner mentorship to

provide students with practical guidance. Academic-industry partnerships can further leverage survey results to codesign capstone projects, internships, or micro credentials with employers.

According to the Bureau of Labor Statistics, employment in computing is projected to grow much faster than the average for all occupations from 2024 to 2034 [10], and the industry is constantly changing. Recent Stanford findings, framed as an early warning 'canaries in the coal mine' study [15], highlights that early career workers in AI exposed computing roles are already experiencing measurable employment disruptions and decline, underscoring how technological change is reshaping not only job demand but also the skills and preparation required for new graduates. So, longitudinal tracking, through repeating the survey every two to three years, will help capture how employer needs evolve and AI (and other) tools mature. Graduate surveys should also be conducted, comparing current graduates from courses not influenced by the survey findings with future graduates who have experienced the enhanced curriculum.

Sector-specific analysis is important, since industries such as finance, healthcare, manufacturing, and creative technology adopt AI in different ways. Sector level analysis would offer deeper insight into how AI is being adopted.

Aligning program findings with policy bodies such as ABET and national workforce initiatives like the U.S. Economic Development Administration (EDA) can broaden institutional impact. Through partnerships with the EDA and participation in sectoral collaborations [11], colleges can better align training with labor market needs, design employer relevant programs, and create clearer pathways into high growth careers.

The most useful future work will make the survey iterative, sector sensitive, and action oriented, helping computing graduates become not only technically competent but also ethically aware, grounded in academic and professional integrity, adaptable, and prepared for interdisciplinary collaboration in the age of AI.

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