Industry Signals to Classroom Practice: Redesigning Practical Cloud Computing for Professional Identity Development

Esteban Flores[1] and Sina Keshvadi[1]

[1]Deparment of Engineering (Software Engineering), Thompson Rivers University, Kamloops, British Columbia, Canada

Background

Cloud computing education frequently lags behind current industry practice. In North American software engineering programs, many cloud courses inherit a CS-centric model that prioritises theoretical concepts over the operational, automation-first workflows (CLI, IasC, networking, observability) expected in entry-level roles.

The senior undergraduate course **Practical Cloud Computing** is explicitly designed for applied, practice-oriented learning in a software engineering context. However, before this redesign, it still faced the common challenge of balancing foundational cloud computing concepts with the specific competencies demanded by industry.

Research Goal

Research Goal: How can we redesign the Practical Cloud Computing course using current industry signals so that it simultaneously delivers core cloud computing fundamentals while preparing students for entry-level cloud roles with the exact tools, workflows, and practices that industry demands?

Curriculum Redesign Method

To redesign the course, we triangulated three complementary evidence streams:

- **Industry-demanded skills**: We analyzed **over 130 recent North American job postings** for entry-level cloud engineering and DevOps roles to identify the exact tools, workflows, and competencies employers currently require.
- **ACM CS2023 Curricula:** We reviewed the latest ACM Computer Science Curricula 2023 guidelines to ensure the course retained strong coverage of the foundational theoretical cloud computing concepts that computing programs are expected to teach.
- **Industry 5.0 Framework**: We incorporated the key socio-technical priorities of Industry 5.0 (human-centricity, sustainability, and resilience) so that students learn cloud computing as an engineering practice that addresses real-world societal and environmental constraints.

Job Posting Analysis

- Analyzed **over 130 recent North American job postings** for entry-level Cloud and DevOps roles to identify current industry requirements.
- Job market research showed Cloud Engineer (20%) and DevOps Engineer (12.9%) as the **most common entry-level roles**.
- Research identified "Identity" (IAM) and Zero Trust Architectures as the **new technical perimeter**, replacing traditional high-level policy definitions.

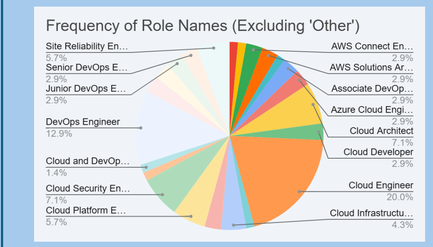

Fig 1: Cloud Computing Industry Most Common Entry Level Job Roles

- Identified critical needs for Hybrid Cloud connectivity, Site Reliability Engineering (SRE), and Observability that were missing in previous curricula.
- While 2018 curricula focused on Big Data volume, **2025 job requirements prioritize the architectural engineering of Data Lakes and ETL pipelines.**

New Knowledge Areas

Rigorously discussed and produced 15 new Knowledge Areas (KAs) distributed among 4 main domains:

- **Domain A: Foundations & Infrastructure:** Focuses on Cloud Economics (FinOps), VPC topologies, and architectural trade-offs between VMs and Serverless.
- **Domain B: Engineering & Operations:** Prioritizes CI/CD pipelines (GitOps), Kubernetes orchestration, and proactive SRE observability.
- **Domain C: Architecture & Development:** Covers Microservices, Event-Driven designs, and Infrastructure as Software using Cloud SDKs.
- **Domain D: Specialized & Emerging Tech:** Integrates Data Engineering (ETL Pipelines), Applied AI/MLOps, and sustainable "Green Cloud" patterns.

All KAs and their corresponding Learning Objectives can be found in the full paper.

Findings

- We held a pilot run of the course using the new 15 KA framework developed in this research
- **80% of students felt inclined to pursue professional certifications (e.g., AWS, Azure) a**fter exposure to the new framework, demonstrating it works.
- Students identified shifting to the **Command Line Interface (CLI) helped them feel ready for the industry**
- Replacing passive theory with **IaC, Kubernetes, and CI/CD pipelines** significantly increased student confidence in technical interviews.

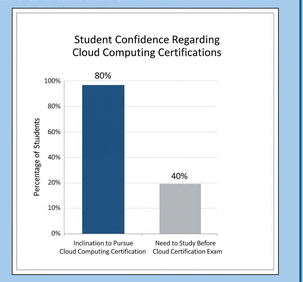

Fig 2: Student Confidence Regarding Cloud Computing Certifications

Conclusions and Future Work

- The 15-KA framework provides a robust, adaptable roadmap for preparing future-proof cloud professionals.
- Successfully replaced passive theory with active engineering skills (CLI, IaC, and Kubernetes).
- We plan to refine the course outline and teaching style using feedback from the pilot run.

Full Paper and References