Project

SENG 4620 Practical Cloud Computing - Aligning Curriculum with Entry-Level Cloud Architect Roles

General Topic

This SoTL project focuses on teaching “SENG 4620: Practical Cloud Computing”. The core challenge and motivation is to design and deliver this course in a way that effectively prepares 4th year undergraduate software engineering students with the practical skills and architectural understanding required for entry-level cloud architect positions in industry.

My general topic is focused on determining effective pedagogical strategies within SENG 4620 to effectively prepare students for the demands of an entry-level cloud architect role.

Constrains:

- Semester-long group project is mandatory.
- 10 mandatory 2-hour labs are required, each with a lab report.
- At least one midterm exam (theory or practical) is required.
- A written final exam is required.
- Grading must follow departmental weighting ranges:
    - Assignments/Case Study: 0-15%
    - Lab Reports: 0-20%
    - Midterm(s): 20-30%
    - Final Exam: 35-50%
    - Group Project: 15-30%
    - Participation: 0-5%
- Free labs and resources are available via AWS Educate.
- Most students are expected to have prior co-op experience.
- Students lack a formal computer networking background which is a significant prior knowledge for learning cloud architecture.

20 Questions exercise

1. What specific technical skills, conceptual knowledge, and professional competencies are most frequently required for entry-level Cloud Architect roles based on current industry job descriptions?
2. What percentage of identified entry-level cloud architect competencies can realistically be addressed within the scope of a single-semester undergraduate course like SENG 4620?
3. What foundational knowledge and prior experiences most significantly predict student success in learning advanced cloud computing concepts and skills?
4. What is the optimal balance and integration between lectures, individual hands-on labs, and a semester-long group design project for developing both conceptual understanding and practical cloud architecture skills?

5. What pedagogical strategies (e.g., specific lab designs, project structures, case studies) are most effective for teaching complex topics?
6. How can course design effectively prepare students to transfer knowledge gained from an AWS-focused curriculum to understanding analogous concepts on other major cloud platforms (e.g., Azure, GCP)?
7. How can realistic constraints (e.g., budget limitations, data privacy, etc) be effectively incorporated into the course projects?
8. How can teamwork and collaboration skills required for cloud projects be effectively developed and assessed within the group project component?
9. How effective are hands -on labs in developing students' proficiency with cloud services?
10. To what extent does participation in a semester-long, project-based learning assignment enhance students' ability to integrate multiple cloud services and apply architectural design principles to solve a complex problem?
11. What methods are most valid and reliable for assessing complex cloud architecture design skills?
12. How accurately do the course's summative assessment methods align with measuring the specific competencies identified as critical for entry-level cloud architect roles?
13. What formative assessment strategies are most effective for monitoring student progress and identifying misconceptions related to complex cloud services or architectural principles during the course?
14. What are the common conceptual difficulties or specific services/architectural concepts that present the most significant learning challenges for students?
15. How does student confidence and self-efficacy regarding specific cloud tasks evolve from the beginning to the end of the SENG 4620 course?
16. What are students' primary career-related concerns and perceived opportunities regarding the cloud architect profession, and how do these views potentially change after completing SENG 4620?
17. Which course components (e.g., lectures, specific labs, project work, AWS Educate resources) do students perceive as most valuable and realistic in preparing them for an entry-level cloud architect position?
18. How do students perceive their preparedness to apply for an entry-level cloud architect position?
19. How does the instructor perceive students' preparedness to apply for an entry-level cloud architect position?
20. How do students perceive the anticipated balance between AI-driven automation and necessary human expertise (e.g., strategic design, communication, ethical judgment) within future cloud architect roles?
21. From the instructor's viewpoint, what are the primary challenges and effective strategies when designing and delivering a practical, industry-aligned cloud computing course using platforms like AWS Educate?
22. How do specific pedagogical choices impact instructor workload, course management, and the ability to provide timely feedback?

Research Questions

RQ 1. How effectively can industry-identified skills for entry-level Cloud Architects be translated into measurable learning outcomes and aligned activities within a Practical Cloud Computing course structure?

RQ 2. What are undergraduate software engineering students' primary career-related concerns (including perceived limitations) and opportunities regarding the cloud architect profession, and how do these views change following completion of a Practical Cloud Computing course?

RQ 3. To what extent does participation in the semester-long, project-based learning assignment enhance students' ability to apply architectural design principles and their self-efficacy in tackling complex cloud integration tasks?

RQ 4. How effective are externally provided resources, such as AWS Educate labs, in preparing students for complex cloud configuration and troubleshooting tasks compared to other course components?

RQ 5. Which course components (e.g., lectures, specific labs, the group project) do students perceive as most valuable in preparing them for entry-level cloud architect positions?

RQ 6. How confident do students feel about applying for entry-level cloud computing positions after completing a Practical Cloud Computing course?

Expected Outcomes

- Aligning the SENG 4620 curriculum, labs, and project with entry-level cloud architect competencies is expected to significantly improve students' measured abilities and self-reported confidence in performing core cloud tasks.

Initial Literature Review Considerations

- Effective pedagogical approaches for teaching cloud computing.
- Competency-based assessment in engineering and computer science education.
- The use of cloud platforms (AWS, Azure, GCP) and industry certifications in academic curricula.
- Project-based learning effectiveness in developing design and problem-solving skills.
- Measuring self-efficacy and student perceptions in technology education.

Feasibility

Key challenges include accurately identifying core industry competencies, redesigning course components (lectures, labs, project) to align, and developing reliable instruments to measure complex skill acquisition (distinct from measuring self-efficacy or preparedness, which also present measurement challenges). Isolating the specific impact of individual course elements (e.g., labs vs. project) on learning outcomes and addressing potential limitations due to small class sizes.