ISSN: 2473-4901
v11 n6336

Certify, Don't Test: Integrating AWS Cloud Practitioner Certification in Undergraduate IT Courses as the Final Exam

Jeff Strain
jeff.strain@byuh.edu
Brigham Young University–Hawaii
Faculty of Math & Computing
Laie, HI, 96762

Abstract

This teaching tip examines replacing a traditional course final exam with the AWS Cloud Practitioner certification in an undergraduate information technology (IT) program. This paper aims to help students move beyond theory and gain practical, job-ready skills. This approach incorporates real-world credentials into their coursework. The goal is to make graduates more employable by better aligning assessments to industry expectations. Over two semesters, students enrolled in a systems administration course were guided through certification preparation, supported by peer learning groups, structured practice exams, and hands-on logistical planning for test administration via Pearson VUE. A mixed-methods evaluation—comprising student surveys, performance data, and faculty observations—revealed several emerging themes: increased student engagement and motivation, heightened technical readiness, but also stress associated with high-stakes testing and logistical hurdles around scheduling and exam administration. Some key successes depended on early exam scheduling, support from both tutors and staff, and checks to ensure all devices were ready. Although the certification-based model brought clear educational and career benefits, it also highlighted the need to address technical, procedural, and emotional challenges proactively. This paper offers recommendations for educators considering certification as a form of assessment. It illuminates common institutional challenges and shares the insights gained. The hope is to support the broader adoption of certification-based assessments, which helps encourage IT education to align with academic goals and industry needs.

Keywords: Certification, Assessment, Cloud Computing, AWS

ISSN: 2473-4901
v11 n6336

Certify, Don't Test: Integrating AWS Cloud Practitioner Certification in Undergraduate IT Courses as the Final Exam

Jeff Strain

1. INTRODUCTION

The accelerating transition toward Industry 5.0 (Xu et al., 2021) brings new expectations for how technology is applied, integrated, and managed across sectors. Unlike its predecessor, which prioritized automation and digital efficiency, Industry 5.0 emphasizes human-centric solutions within technologically dense environments (Adel, 2022). This paradigm shift requires professionals who not only possess theoretical knowledge but can navigate increasingly complex systems. Systems that rapidly evolve yet often still bear the scars of past design oversights and uncorrected implementation flaws (Daoudagh & Marchetti, 2023).

Within this context, cloud computing remains one of the most transformative forces shaping technological infrastructures. First introduced at scale during Industry 4.0, cloud services now permeate nearly every layer of enterprise IT, from back-end storage and virtualized servers to scalable application hosting and AI deployment platforms (Qasem et al., 2019). Cloud computing initially promised to bring simplification through elastic infrastructure and centralized management. In practice, cloud computing has introduced complexity through layers of abstraction and additional features that were previously not feasible. This complexity is most evident in the area of technological proficiency. The elastic nature of cloud computing with features that were previously out of reach for most companies changes how the industry works (Mew & Money, 2018; Segec et al., 2021).

Importantly, the educational sector is not immune to these dynamics. Academia itself has adopted cloud solutions to support teaching, research, and administration, benefiting from the flexibility and cost efficiency that cloud services offer (Mew, 2016). However, despite this adoption, the gap between what graduates know and what the workforce expects remains wide. The gap is particularly evident in cloud computing. As enterprises migrate more critical functions to the cloud, they encounter escalating risks associated with misconfiguration, policy enforcement, and inadequate threat modeling—challenges due to a lack of understanding of cloud-native principles among new Information Technology (IT) professionals (Oyeniyi & Oyeniran, 2025).

Despite the pervasive role of cloud technologies in modern industry, recent graduates often enter the workforce underprepared to engage meaningfully with these systems. As Wagner et al. (2025) note, this skills gap is no longer limited to niche technical roles but affects broad swaths of the technology labor market. Employers increasingly expect graduates to arrive with both foundational knowledge and applied competencies, abilities that are rarely cultivated through lecture-based instruction alone. The integration of industry certifications into undergraduate curricula is a pedagogical model that forces alignment with current industry demands. Furthermore, it provides students with tangible evidence of their skills and competencies.

Role of certifications in the workforce

While college degrees continue to dominate job qualifications in technology-related fields, industry hiring practices increasingly reflect a demand for professional certifications. Employers recognize that while a degree offers broad foundational knowledge, certifications provide immediate, role-specific validation of skills aligned with current technologies and tools (Marquardson & Elnoshokaty, 2022). This shift does not signal a wholesale replacement of degrees but rather an evolution in expectations where academic credentials establish credibility and certifications demonstrate readiness. In IT domains, employers are increasingly listing certifications as either preferred or required qualifications in job postings (Spencer, 2025). The trend to prefer and require certifications sheds light on industry demands to keep up with the rapid pace of change that occurs in IT. This fast pace of change also places pressure on higher education institutions. Higher education needs to rethink how curricula can support not just theoretical understanding but also practical, certifiable expertise. As workforce requirements grow more dynamic, institutions that integrate certifications into degree programs may be better

positioned to prepare graduates for the realities of the job market by validating skills above obtaining a higher education degree (Association for Computing Machinery [ACM] & IEEE Computer Society, 2017, pp.40-41).

A Challenge
Traditional curricula, though foundational, often lag behind the pace of technological innovation, leaving students underprepared for modern professional environments (Gerontakis et al., 2023; James & Callen, 2018). The lack of key IT domain knowledge in recent graduates is contributing to the persistence of the skills gap among graduates (Tran et al., 2023).

2. IMPACTS IN HIGHER EDUCATION

The gap is evident in cloud computing, where immense complexity and constant change regularly outpace the academic calendar. While cloud technologies have been part of higher education curricula for over a decade (Chen et al., 2012), their adoption has not kept pace with the integration of industry practices. Cloud technologies can no longer be treated as peripheral (Correia & Tasker, 2022); they are central to contemporary systems infrastructure, and slow adoption undermines institutional relevance.

Institution Benefit
A key advantage of public cloud adoption in curricula lies in the elimination of costly physical infrastructure for student lab environments. Cloud-based environments reduce the financial and logistical burden of maintaining on-premise labs, enabling scalable, virtual computer labs accessible to a broader student population (Murphy & McClelland, 2009). Despite the lower costs, many institutions remain hesitant to integrate public cloud platforms into their core programs. Without access to hands-on, real-world technology applications, students may leave college without the competencies employers now consider essential.

Western Governors University's response has been to embed industry certifications directly into curricula, requiring certification attainment for graduation in Information Technology, Cybersecurity, and related majors. Other institutions offer credit for prior professional certification, recognizing the real-world value of credentials earned outside traditional classrooms (Morrey, 2023). This practice acknowledges that certifying bodies, such as SANS and EC-Council, not only operate with academic rigor but are also accredited as institutions of higher learning, awarding undergraduate and master's degrees. The implication is that industry certification may no longer be supplementary: it may be becoming integral to academic credentialing.

Given the velocity of change in the IT sector, academic programs must also adopt mechanisms for annual review and continuous curriculum improvement to remain relevant (Goteng et al., 2022; Erickson & Kim, 2021). Certifications are updated regularly and help to solidify this process when embedded in curricula by prompting change as the certification materials are refreshed.

Experiential
To better align educational outcomes with labor market needs, several scholars advocate for curriculum models that emphasize experiential learning, flipped classrooms, and content aligned with certifications (Erickson & Kim, 2021; Towhidi & Pridmore, 2023). This is pushing back on prior academic concerns that certifications may not cover all relevant material (Association for Computing Machinery [ACM] & IEEE Computer Society, 2017, p.27). Active, hands-on engagement in labs, simulations, and cloud computing platforms allows students to practice complex problem-solving in environments that mirror industry conditions. This approach has been shown to improve both test performance and job readiness (Goteng et al., 2022) and fosters the kind of high-impact learning experiences that promote long-term retention and adaptability (James & Callen, 2018; Tran et al., 2023).

Timing
Introducing cloud computing and certification pathways early in a student's academic journey ensures deeper familiarity and better preparation by the time of graduation (Woods, 2018; Strain et al., 2025). Ultimately, the institutions most responsive to these challenges (through curricular flexibility, strategic partnerships, and embedded certifications) are best positioned to serve both their students and the broader demands of the digital workforce.

Student Benefits
Students benefit from academic programs that integrate industry certifications and experiential instruction. One of the most immediate advantages is increased employability. Industry certifications, including but not limited to those from ISC2, ISACA, CompTIA, AWS, GIAC(SANS), RedHat, Microsoft, Cisco, LPCI, and EC-Council, serve as verifiable indicators of skills and readiness. Certifications signal to employers that a candidate can perform in real-world

environments without extensive on-the-job training (Morrey, 2023; Tran et al., 2023). Embedding certifications into academic pathways or offering credit for prior completion reduces redundancy for students and aligns their scholastic accomplishments with industry-recognized standards. This dual credentialing approach gives students a competitive edge in a market that increasingly values demonstrable, hands-on competence over theoretical knowledge alone.

Another significant benefit is improved learning outcomes and confidence. Hands-on, scenario-based instruction, whether through flipped classrooms, virtual labs, or real-world simulations, allows students to engage actively with the material rather than passively consuming it (Towhidi & Pridmore, 2023). Students exposed to these high-impact practices not only perform better on assessments but also feel better prepared to transition into professional roles (Goteng et al., 2022; James & Callen, 2018). Cloud computing environments, in particular, offer scalable and low-cost access to enterprise-grade tools, thereby leveling the playing field for students who are otherwise constrained by campus infrastructure or financial limitations (Murphy & McClelland, 2009). Moreover, when cloud technologies are introduced early in a student's academic career, students gain more time to build familiarity and develop deeper technical fluency (Woods, 2018; Strain et al., 2025).

Cloud computing has become an essential skill in modern IT. Industry professionals use cloud-based infrastructure, platforms, and services to support their operations, deliver reliable backups, deploy scalable applications, and secure remote environments. This demand has made cloud proficiency a baseline expectation for entry-level professionals, not just an advanced skill (Qasem et al., 2019). As cloud computing becomes foundational in IT, academic institutions must prioritize it to remain aligned with industry expectations and better prepare students for the realities of the workforce.

A significant advantage of cloud computing in education is its ability to address infrastructural and socioeconomic disparities. Traditional IT often requires expensive, specialized hardware and software environments that many students, especially those studying remotely or from under-resourced backgrounds, cannot access. Cloud computing offers a solution by providing scalable, virtualized lab environments that remove the need for overpowered local machines or physical on-campus resources (Strain et al., 2025). In this context, students can gain hands-on experience using only a basic internet-connected device, leveling the playing field across economic and geographic boundaries. Furthermore, cloud-based platforms allow institutions to deliver consistent lab experiences both in-person and online, which is especially critical in an era of hybrid and remote learning (Moltó et al., 2020).

Public Cloud

Although several cloud providers exist, including Microsoft Azure and Google Cloud Platform, Amazon Web Services (AWS) remains the most mature and widely adopted platform in academic settings (Meyer & Billionniere, 2021). This maturity translates into more comprehensive learning pathways, better documentation, and more substantial support for educators developing cloud-based curricula. Importantly, student satisfaction with the AWS cloud learning platforms is generally high. For example, students have reported positive experiences with AWS-based labs and instructional content, with improved understanding, confidence, and engagement in technical topics (Milošević et al., 2022). Increased understanding, confidence, and engagement suggest that cloud-based instruction not only increases access but may also enhance learning outcomes. AWS is currently the largest cloud service provider in the world and has developed specialized academic initiatives to support cloud-based education (Goteng et al., 2022). Two student initiatives from AWS, AWS Educate and AWS Academy, offer access to cloud resources and a curriculum designed to help students gain practical, job-ready skills. While AWS Educate provides access to extremely limited and task-specific environments for all learners, its utility has become increasingly limited in recent years due to the removal of a mostly open playground with credit allocations and administrative restrictions. In contrast, AWS Academy, available only to students at partner institutions, offers more robust features, including guided labs, instructor support, and course content aligned with certification paths, as well as lab-specific course content or self-exploration.

These resources have seen increased adoption in academic institutions globally. Cloud education through platforms like AWS has grown over the past few years, enabling more students to engage with real-world technologies during their coursework (Strain et al., 2025; Flood & Hall, 2022). This integration is not only helping students understand abstract concepts through practical application but is also helping educators

modernize course delivery without relying on traditional hardware labs. The flexibility and scalability of cloud platforms allow for dynamic assignments, project-based learning, and team collaboration in ways that are difficult or impossible in conventional classroom settings.

Cloud computing serves as an enabler of modern education in the fields of IT. It meets pedagogical and logistical needs by increasing accessibility, reducing costs, and enhancing instructional quality. By incorporating cloud computing into the IT curriculum, students are better equipped for the industry. AWS Academy plays a central role in the adoption of cloud computing in higher education. A cloud partner can offer structured pathways for students to acquire essential skills, micro-credentials, and pathways to certifications. As the cloud continues to shape the technology workforce, academic institutions must continue to innovate by integrating cloud-based tools and curricula that reflect real-world environments.

Instructor and Instructional Benefits

The integration of industry certifications into academic programs benefits not only the students. Institutions that embrace certifications see an increase in institutional effectiveness and instructional quality (Mbise, 2021). As technology advances at this fast pace, faculty must stay current with the latest tools and methodologies. The need to stay current has prompted a growing recognition within academia of the need for instructor-focused training. Some academic conferences have begun incorporating training (Nwokeji et al., 2021). Certification partner programs may also provide training.

This shift is both timely and essential, as instructors often serve as the primary bridge between evolving industry expectations and students' academic preparation.

Institutions that support and incentivize faculty certification are beginning to see tangible benefits. Certification does more than validate instructors' technical expertise. Instructor certifications improve teaching outcomes. In one study, 70% of surveyed instructors reported that earning IT-related certifications led to better student performance, increased self-confidence, and more effective teaching delivery (Mbise, 2021). Better performance, confidence, and teaching delivery suggest that professional development in the form of certification is more than a resume enhancer; it is an instructional improvement tool. Moreover, as more institutions formally demand certificates or embed credentialing pathways within degree programs, they signal alignment with industry needs and responsiveness to labor market demands.

Academic Partnerships

Forming academic partnerships with industry providers is a strategic move for higher education institutions, helping to modernize and enhance IT and cybersecurity programs. Through initiatives such as AWS Academy, institutions gain access to industry-aligned curricula and cloud-based lab environments. Many industry educational providers offer micro-credentials and certification pathways that support student learning and faculty development.

Becoming an AWS Academy institution involves a formal application process, during which institutions agree to deliver AWS-authored content and meet minimum instructional and technical requirements (Strain et al., 2025). Once an institution is approved, it receives structured course materials designed to prepare students for the workforce and AWS certifications. They also gain access to no-cost cloud infrastructure, which is necessary to deliver hands-on experiences (Strain et al., 2025).

The impact of these partnerships has been overwhelmingly positive. Students enrolled in AWS Academy programs report greater engagement and readiness for cloud-focused roles, while instructors benefit from structured resources and technical training that improve teaching effectiveness (Segec et al., 2021). Faculty receive onboarding and continuous training from AWS, ensuring that instructors stay current with evolving cloud technologies and pedagogical best practices (Goteng et al., 2022). By leveraging academic partnerships with cloud providers, institutions can accelerate curriculum modernization, expand access to industry-relevant skills, and better prepare both students and faculty for the demands of today's digital workforce.

3. ABOUT THE CLASSROOM

This pilot study explored the integration of the AWS Certified Cloud Practitioner certification into a systems architecting course. Designed to address logistical and pedagogical challenges, this course combined industry certification, which included remote proctoring, and a capstone project that promotes active, applied learning in cloud computing. The study was conducted at a U.S.-based institution with a student population primarily composed of international students.

The Course

This experiment was conducted in an IT capstone

ISSN: 2473-4901
v11 n6336

course covering Architecting Computer Services. It is the only class that is both required in the program and has a complete focus on cloud computing. Relevant parts of the Syllabus are included in Appendix A.

The Class

While class enrollment is typically around 25, these two semesters (Fall 2024 and Winter 2025) had 19 and then 11 students, providing an opportunity for more focused instructor-student engagement and iterative refinement of the course design. The institution does not have an on-site testing center, which necessitated the use of remote proctoring solutions. One of the driving motivations behind this pilot was the opportunity to outsource both exam development and proctoring, which are typically time-consuming tasks for faculty and pose logistical challenges in smaller or resource-limited academic environments.

Certification Selection

Given these constraints and opportunities, the AWS Certified Cloud Practitioner certification was selected as the most appropriate credential for integration into the course. Even though much of the materials align with the certification above, which is AWS Certified Solutions Architect – Associate. Several factors made this certification particularly appealing. First, it has been used successfully in other academic settings, providing a model of integration that is both feasible and effective (Podeschi & DeBo, 2022). Secondly, the cost of the certification is relatively low compared to other industry-recognized credentials, making it6cessible to students from diverse socioeconomic backgrounds, a key consideration at an international institution with varied student financial situations. The university covered the cost of the certification during the duration of this experiment.

From a pedagogical standpoint, the AWS Cloud Practitioner certification serves as a foundational, entry-level credential and introduces students to cloud computing concepts. Due to being an entry-level certification, it does not require deep professional technical expertise. According to a 2022 survey of professional certifications, the AWS Cloud Practitioner was ranked second overall, just ahead of another related AWS certification, in terms of value and demand based on certifications held and reported outcomes (Cummings et al., 2023). The ranking of the certification confirmed its relevance for both current job markets and academic contexts.

Experiential Learning

In addition to preparing for the certification exam, students choose a capstone project that requires them to build and present a basic cloud architecture using AWS services. A project applies components aligned with the "Create" level of Bloom's Revised Taxonomy, encouraging students not only to remember and understand concepts but to apply, evaluate, and ultimately design original solutions based on what they have learned (Krathwohl, 2002). By challenging the students with an active, self-designed project, they transition from passive learners. This aims to foster deeper learning, skill retention, and confidence with active, hands-on participation. This project was completed in the AWS Learners Lab. The learner lab was used rarely in class before the project, but some videos were provided.

eBooks

The course uses two eBooks with the option to add a third to review content from a prior course. All three are part of AWS Academy. The optional eBook is Cloud Foundations and is required in part of an introductory IT class most students take in their first year, and takes up about 3 weeks of class time. There is usually a year or two between students taking that course and the course in this paper. Due to this gap, upon requesting access, students may be added to the current semester's Cloud Foundations eBook. The main eBook for learning is Cloud Architecting and takes up two-thirds of the course time. The final eBook is the AWS Learner Lab. This is a lab environment used to complete custom assignments, such as the individual project.

Labs

The labs in AWS Academy Cloud Foundations are beginner-friendly guided exercises. They introduce students to core AWS services such as EC2, S3, and IAM. Each of these labs contains step-by-step instructions.

In the Cloud Architecting course, there are some guided labs and more complex challenge labs. The labs in this course are scenario-based. This requires students to design, deploy, and troubleshoot all while using a broader range of AWS services, bringing in higher availability and fault tolerance. Both sets of labs emphasize hands-on experience, reinforcing theoretical concepts through real-world application.

Cloud Foundations and Cloud Architecting courses have a special lab towards the bottom of the modules called a sandbox. This is a place where students can play and learn. As of the writing of this paper, every time you ended the sandbox lab

for these two courses, the sandbox lab reset completely. This allows students to try new things without it affecting future learning.

The AWS Learner Lab is unique in that when it ends, it is not reset. This allows students to work on projects that take longer than a few hours and is ideal for playing with more complex assignments. Students can choose to reset it if they want to start over manually. While it does not automatically reset, some resources are not available when the lab is shut down. This is where the individual projects were completed.

Readings and Chapter Quizzes
Most of the readings for the course were in the Cloud Architecting eBook. Other supplementary material included AWS documentation. The eBook had end-of-chapter quizzes that were not proctored and could be repeated till the desired score was obtained.

In-Class Quizzes
Proctored quizzes that covered course readings and lab comprehension were given at the beginning of class. Eventually, all content contained in the official exam guide was open for in-class quizzes. These quizzes ended when the project became the primary focus of the course.

Practice Tests
Practice test questions were obtained in a few different ways, including:

- Instructor created
- Tutor/Teaching assistant created, and instructor reviewed
- Obtained from other instructors at a different institution
- Multiple books with practice exams were purchased and made available to the students in a study area

Organically Added Content
Students used LLMs to help them study, including creating practice questions. This was not prompted by the course, but happened naturally. The questions and answers had mixed levels of accuracy.

Videos and content on YouTube and Udemy were another resource that students mentioned using. This was not provided content. We also prompted "Other" to catch things that may not have been as visible.

Notable Difference Between Semesters
The second semester had some added stress as the certification voucher dispersal did not happen in a timely manner due to the voucher provider going bankrupt. This had a minimal impact on the study.

4. METHODOLOGY

This study was conducted over two academic semesters at a small international university. The course was designed to introduce students to systems architecting and is done with AWS cloud computing concepts by integrating the AWS Academy courseware and instructor content. Surveys were conducted in Fall 2024 (N = 19, n = 18) and Winter 2025 (N = 11, n = 8), resulting in a total of N = 30 and n = 26, giving an overall response rate of 86%.

The course design consisted primarily of: the AWS Academy course (AWS Academy Cloud Architecting), regular in-class quizzes, classroom instruction that is aligned with the AWS certification blueprint, and a capstone project for the last 1/4 of the semester. AWS Academy Cloud Architecting course follows the domains outlined by AWS and is supplemented by cloud-based labs, guided in-class activities, and the individual capstone project.

The author also draws upon personal expertise and observational data to inform this work. As of the date of writing this paper, the author holds numerous active certifications across multiple certification bodies.

To gather student perspectives, a survey was administered near the end of the semester in the student learning management system (LMS), likely before most students had attempted the certification exam. The survey collected data on the students and included both quantitative and qualitative data on their perceptions of attempting an industry-standard exam.

Open-ended questions were coded by the paper's author and validated by an LLM to check for accuracy. Only slight phrasing differences were noted.

5. LESSONS LEARNED

These lessons are essential for the effective integration of certification into a university course. The hope is to inform similar efforts at other institutions, especially those without dedicated testing centers or large-scale support infrastructure.

Create Peer Support
An earlier trial run was conducted before the actual trial. A few tutors/teaching assistants, who had previously taken the course, were tasked

with taking the certification test. They were given little to no coaching, and their insights were incorporated into the information given to students. These peers, the tutors who participated in the earlier trial run, were also available to answer questions from the students in the classes and to assist the instructor with exam day logistics.

Leverage Peer Support
Peer support, in the form of tutors and other students, emerged as one of the most valuable components of student success. Peers helped answer questions, pointed students in the direction needed when asked about questions on practice tests, and provided general support. Peers provide a low-stakes environment for students to reinforce concepts and build confidence for exams.

Encourage Early Exam Scheduling
One critical lesson learned was the importance of scheduling exams as early in the semester as possible after instruction has been completed. Students were encouraged to book their certification exams well before the end of the semester. Some students were unable to start the test for different reasons the first time. Person VUE was punctual with the rescheduling, but this still took a minimum of 24 hours and, on a few occasions, took days. Scheduling early at the end of the semester reduces end-of-term stress and allows time to handle unforeseen technical issues. Platforms like Pearson VUE enforce a 14-day waiting period between attempts. This waiting period makes early scheduling essential to allow time for potential retakes within the semester. Taking the test more than 14 days before the end of the semester is possible with the course structure, which includes a project at the end of the semester. While none of the students chose to do this during the semester, some did decide to retake it after the semester ended. As instructors do not have visibility into professional certifications, they would not know if a student has taken it multiple times.

Schedule Rooms
Most students did not have a quiet, private place where they could take an industry exam remotely without being interrupted. Most of them live on campus and, being international, are not allowed to drive in the US. The bus to the nearest testing center, as of writing this paper, is about 2 hours away. Knowing this beforehand, we worked with our campus scheduling to get rooms and, when possible, put up signs and had helpers, such as tutors, teaching assistants, and the instructor, to keep people from entering.

Streamline Exam-Day Logistics
Managing exam day logistics helps provide a smooth test experience. Students should arrive 45 minutes early to allow sufficient time for the check-in process. The check-in process starts 30 minutes prior to the exam's scheduled start and can take a significant amount of time. Staggered start times, spaced by 15-minute intervals, can prevent bottlenecks at local check-in if support like room scheduling and rotating is provided. Active testing areas were marked and tracked to monitor room availability and prevent overlap.

Perform System Checks
The use of Pearson VUE's online proctoring system demanded thorough preparation. In-class devices are checked in advance for compatibility with proctoring software and webcam functionality. This check is requested in an email after signing up for the exam. Pre-exam checklists and trial runs helped identify and address problems before the official exam window.

Prepare for Technical Challenges
Remote proctoring introduced several technical hurdles. Common issues included expired identification, failed software installations, network instability, inactive users not logged out, and inadequate device permissions. Students should be prepared for how to handle these before the exam date. Some of these should be caught with the pre-check.

While we did have a few loaner laptops available and used for the exam, we have since learned that this is not allowed by the testing companies. The institution has some laptops that can be loaned out, but students lack sufficient privileges to install and run the proctoring software.

Financial Barriers
One challenge highlighted by students is the financial barrier associated with taking industry certification exams. Partnerships and education discounts may not be enough. Given that exam fees can be a substantial burden, especially for students with limited personal resources, programs that integrate financial support directly into the curriculum or offer scholarships for certification can dramatically increase student participation. Reducing or eliminating cost barriers promotes equitable access to certifications. All of the resources for this class are provided to the student free of charge. The Ebooks, Labs, Tests, Etc. Some choose to use paid content to augment what was provided in class.

Resource	Reason It Was Helpful	Frequency of Mention
Labs	Provided hands-on practice Helped understand AWS services Connected theory to application	10 students
Practice Tests	Simulated real test format Showed correct answers/explanations Identified weak areas	9 students
Chapter Quizzes	Matched test format (MCQ) Reinforced content Helped review	7 students
Learner Lab	Allowed exploration / trial-and-error Reinforced services knowledge Supported hands-on learners	7 students
In-Class Quizzes	Similar to exam questions Helped identify what to study	6 students
Readings	Provided foundational knowledge Used for in-class quizzes	5 students
ChatGPT / LLMs	Helped break down hard questions Clarified concepts with examples Acted as a tutor	5 students
External Tools (Udemy, YouTube, etc.)	Broadened perspective Offered visuals & tutorials Reinforced material	5 students
Sandbox	Helped only when guided by project goals Otherwise less helpful	2 students

Table 1: Perception of What Helped Most According to Student Survey Feedback

Ensure Instructor Certification or Familiarity
An important pedagogical insight is the value of instructor certification. Instructors who teach courses aligned with professional certifications should either hold the same certification or a similar certification or be well-versed in its content. Instructor certification enhances the credibility of instruction and makes for a better classroom experience.

Start Small
Start with the peers, then move to a small class. Maybe start at a lower-level certification than expected. For this study, it was initially planned to use the AWS Cloud Architect – Associate Exam. After the trial run with peers, we stepped back to the AWS Cloud Practitioner while we continue to mature.

6. SURVEY INFORMATION

A survey was calendared a week before the end of the semester, but was not required and could have been taken before or after, up until the course ended. The survey, in Appendix B, asked if this was the first time taking an industry-standard exam, and the answer was 100% yes. Asked if English is the primary language, only 15% said yes. While language barriers could be an issue, it was not something frequently mentioned.

Lessons Learned Questions
The following questions on the survey helped inform the creation of earlier parts of this paper. They include:

What problems did you have leading up to and while taking the exam?
What would you have liked to know before taking the exam?
We all know taking a test is stressful. Taking an industry-standard test is even more stressful.
Is there something that would have stopped you from taking the test if not for the help you received from the university or the class?

Student Perceptions
Students were asked to share their perceptions of what helped them most prepare for the industry-standard test and to list them in order of most helpful. Labs and practice tests were listed as the highest, with quizzes listed as the most frequent.

They found labs and practice tests to be most valuable (see Table 1).

Additional Benefits
After running the experiment, students who did not participate but had heard of the experiment began to ask if they could substitute the industry standard certification for the final exam in classes aligned with a certification.

ISSN: 2473-4901
v11 n6336

7. DISCUSSION

Replacing a final exam with an industry-standard certification is doable. The challenges are significantly increased if you do not have access to a nearby approved testing center. Giving the option to substitute a final exam with an industry certification should be explored, although there are socioeconomic issues. These socioeconomic issues can be partially mitigated by Academic Partnerships and other programs that may provide students with discounts. Scholarships and other needs-based programs should also be pursued.

Testing Center Accessibility
If you lack a nearby testing center, your workload increases significantly. Consider making a certification attempt an optional replacement for the final exam. By doing this, students can choose whether to take the exam in person or remotely. By having it as optional, less assistance would be required by the instructor and institution.

Instructor / Institution Preparation
Where certified instructors cannot be easily found, they should be created by upskilling current faculty with professional development (Association for Computing Machinery [ACM] & IEEE Computer Society, 2017, p.26)

Aftermath
After running this experiment, I have been asked in every class if an industry certification can substitute for our final exam. I am working on adding that to all of my courses and hope to follow up with some research from that effort.

Additional Research
Further research is warranted on the use of industry certification exams as an alternative form of summative assessment, particularly when offered as a replacement for traditional final exams.

Given the rapid pace of technological advancement, particularly in areas like cloud computing and cybersecurity, there is a growing need to revisit and update the ACM 2017 IT Curriculum Guidelines. As the framework approaches the end of its intended lifespan, a refreshed set of recommendations would help ensure continued alignment between academic programs and current industry demands.

There is a need for a deeper understanding of faculty requirements and alignment of industry certifications within academic programs.

8. REFERENCES

Adel, A. (2022). Future of industry 5.0 in society: human-centric solutions, challenges and prospective research areas. Journal of Cloud Computing, 11(1), 40. https://doi.org/10.1186/s13677-022-00314-5

Association for Computing Machinery (ACM), & IEEE Computer Society. (2017). Information technology curricular guidance for undergraduate degree programs in information technology (IT2017). https://www.acm.org/binaries/content/assets/education/curricula-recommendations/it2017.pdf

Chen, L., Liu, Y., Gallagher, M., Pailthorpe, B., Sadiq, S., Shen, H. T., & Li, X. (2012). Plagiarism and Programming: A Survey of Student Attitudes. Journal of Information Systems Education, 23(3), 315-324. https://jise.org/Volume23/n3/JISEv23n3p315.html

Correia, E., & Tasker, S. (2022, April 27). The Cloud, the Curriculum and the Classroom: The Case of AWS at one Public Tertiary Institution. Proceedings of the 12th Annual CITRENZ Conference 2021. 12th Annual Conference of Computing and Information Technology Research and Education New Zealand(CITRENZ 2021) & 34th Annual Conference of the National Advisory Committee on Computing Qualifications, New Zealand.

Cummings, J., Janicki, T., & Matthews, K. (2023). Invited Paper: Survey of Technology and Skills in Demand: The 2022 Update. Journal of Information Systems Education, 34(2), 243–255. https://jise.org/Volume34/n2/JISE2023v34n2pp243-255.pdf

Daoudagh, S., Marchetti, E., Buccafurri, F., Ferrari, E., & Lax, G. (2023). Breakthroughs in Testing and Certification in Cybersecurity: Research Gaps and Open Problems. ITASEC. https://iris.cnr.it/retrieve/3051a18d-a802-4dbd-b567-12df53a2a9d2/prod_489958-doc_204091.pdf

Erickson, M., & Kim, P. (2021). Designing cybersecurity curriculum: Exploring the need for industry certifications and experiential learning. Issues In Information Systems. https://doi.org/10.48009/4_iis_2021_9-21

ISSN: 2473-4901
v11 n6336

Flood, D., & Hall, A. (2022). Application of Amazon Web Services within teaching & learning at Coventry University Group. Proceedings of the 6th Conference on Computing Education Practice, 25–28. https://doi.org/10.1145/3498343.3498350

Gerontakis, G., Yannakopoulos, P., & Voyiatzis, I. (2023). Evaluating Cybersecurity Certifications: A Framework for Extracting Educational Scenarios in Cybersecurity Training. Proceedings of the 27th Pan-Hellenic Conference on Progress in Computing and Informatics, 243–248. https://doi.org/10.1145/3635059.3635097

Goteng, G. L., Shohel, M. M. C., & Tariq, F. (2022). Enhancing Student Employability in Collaboration with the Industry: Case Study of a Partnership with Amazon Web Services Academy. Education Sciences, 12(6), 1–18. https://doi.org/10.3390/educsci12060366

James, J., & Callen, J. (2018). CYBERSECURITY CERTIFICATIONS MATTER. Issues In Information Systems. https://doi.org/10.48009/3_iis_2018_193-201

Knapp, K. J., Maurer, C., & Plachkinova, M. (2017). Maintaining a Cybersecurity Curriculum: Professional Certifications as Valuable Guidance. Journal of Information Systems Education, 28(2), 101–114. https://jise.org/Volume28/n2/JISEv28n2p101.pdf

Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview. Theory Into Practice, 41(4), 212–218. https://doi.org/10.1207/s15430421tip4104_2

Marquardson, J., & Elnoshokaty, A. (2020). Skills, Certifications, or Degrees: What Companies Demand for Entry-level Cybersecurity Jobs. Information Systems Education Journal, 18(1), 22–28. https://isedj.org/2020-18/n1/ISEDJv18n1p22.pdf

Mbise, K. (2021). The Role of IT Professional Certifications in IT Instructors' Teaching Quality. International Journal of Education and Development Using Information and Communication Technology, 17(1), 176–187. https://files.eric.ed.gov/fulltext/EJ1285662.pdf

Mew, L. (2016). Information Systems Education: The Case for the Academic Cloud. Information Systems Education Journal, 14(5), 71–79. https://isedj.org/2016-14/n5/ISEDJv14n5p71.pdf

Mew, L., Money, W.H. (2018). Cloud Computing: Implications for Information Systems Development Service Providers and Practitioners. Journal of Information Systems Applied Research, 11(3) pp 35-47. http://jisar.org/2018-11/ ISSN: 1946-1836. (A preliminary version appears in The Proceedings of CONISAR 2017)

Meyer, L., Jr., & Billionniere, E. (2021). AWS Academy vs Microsoft Learn for Educators vs IBM Skills Academy: The Educators Choice. Proceedings of the Society for Information Technology & Teacher Education International Conference, 528–534. https://www.learntechlib.org/primary/p/219180/

Milošević, M., Bogićević, Ž., & Ristić, O. (2022). Implementing the AWS Academy curriculum into a cloud computing course. Proceedings TIE 2022, 278–282. https://doi.org/10.46793/TIE22.278M

Moltó, G., Naranjo, D. M., & Segrelles, J. D. (2020). Insights from Learning Analytics for Hands-On Cloud Computing Labs in AWS. Applied Sciences, 10(24), 1–13. https://doi.org/10.3390/app10249148

Morrey, C. P. (2023). A Method for the Integration of Industry Certifications and Micro-Credentials into Information Technology Degrees. The 24th Annual Conference on Information Technology Education, 131–135. https://doi.org/10.1145/3585059.3611411

Murphy, M., & McClelland, M. (2009). My Personal Computer Lab: Operating in the "Cloud." Information Systems Education Journal, 7(93), 3–11. http://isedj.org/7/93/

Nwokeji, J., Roldan, M., Soltys, M., & Holmes, T. (2021). A Hands-on Approach to Cloudifying Curriculum in Computing and Engineering Education. 2021 IEEE Frontiers in Education Conference (FIE), 1–3. https://doi.org/10.1109/FIE49875.2021.9637137

Oyeniyi, J. O., & Oyeniran, O. A. (2025). Optimizing Information Security In Cloud Environments: A Risk Management Approach And Guide For Enterprise Cloud Security. Journal of Cybersecurity Education, Research and Practice, 2025(1). https://doi.org/10.62915/2472-2707.1213

Podeschi, R., & DeBo, J. (2022). Integrating AWS Cloud Practitioner Certification into a Systems

ISSN: 2473-4901
v11 n6336

Administration Course. Information Systems Education Journal, 20(5), 17–26. https://isedj.org/2022-20/n5/ISEDJv20n5p17.pdf

Qasem, Y. A. M., Abdullah, R., Jusoh, Y. Y., Atan, R., & Asadi, S. (2019). Cloud Computing Adoption in Higher Education Institutions: A Systematic Review. IEEE Access, 7, 63722–63744. https://doi.org/10.1109/ACCESS.2019.2916234

Segec, P., Moravcik, M., & Kontsek, M. (2021). Cloud education – the first AWS Academy in Slovakia. 2021 19th International Conference on Emerging ELearning Technologies and Applications (ICETA), 339–344. https://doi.org/10.1109/ICETA54173.2021.9726602

Spencer, R. (2025). The Urgency of Instituting Systemic Cybersecurity Curriculum within STEM at Secondary Educational Levels in Preparation for Postsecondary Institutions. Journal of Cybersecurity Education, Research and Practice, 2025(1). https://doi.org/10.62915/2472-2707.1217

Strain, J., Marquardson, J., & Gomillion, D. (2025). Conquer the Cloud: Effectively Using the Amazon Web Services Academy Learner Lab for Information Systems Education. Information Systems Education Journal, 23(6), 19–36. https://doi.org/10.62273/FWMT9408

Towhidi, G., & Pridmore, J. (2023). Aligning Cybersecurity in Higher Education with Industry Needs. Journal of Information Systems Education, 34(1), 70–83. https://jise.org/Volume34/n1/JISE2023v34n1pp70-83.pdf

Tran, B., Benson, K., & Jonassen, L. (2023). Integrating certifications into the cybersecurity college curriculum: The efficacy of education with certifications to increase the cybersecurity workforce. Journal of Cybersecurity Education Research and Practice, 2023(2). https://doi.org/10.32727/8.2023.19

Wagner, P., Dark, M., Honomichl, R., Sharevski, F., & Leiterman, S. (2025). The National Cybersecurity Teaching Coalition: Expanding Cybersecurity Education Opportunities. Journal of Cybersecurity Education, Research and Practice, 2025(1). https://doi.org/10.62915/2472-2707.1231

Woods, D. (2018). Introducing the Cloud in an Introductory IT Course. Information Systems Education Journal, 16(1), 13–20. https://iscap.us/proceedings/2017/pdf/4327.pdf

Xu, X., Lu, Y., Vogel-Heuser, B., & Wang, L. (2021). Industry 4.0 and Industry 5.0—Inception, conception and perception. Journal of Manufacturing Systems, 61, 530–535. https://doi.org/10.1016/j.jmsy.2021.10.006

APPENDIX A

Syllabus Information

(IT 426) Architecting Computer Services (3 Credit Hours)
This course focuses on the analysis, design, and integration of core components required for building highly reliable, scalable, and manageable networked services. Students will gain a thorough understanding of cloud architecture and their applications. The course emphasizes the practical application of architectural knowledge to real-world scenarios and fosters intelligent interaction across various formats.

Course Learning Outcomes
Each student who passes this course will be able to do the following:

- Understand and differentiate between various cloud architectures, as well as learn how to apply them in designing and integrating computer services.
- Apply knowledge of cloud architectures and service design principles to real-world examples, demonstrating the ability to create and implement effective solutions.
- Analyze and address the challenges associated with implementing and managing cloud architectures, considering aspects such as security, privacy, and scalability.

Teaching Approach

This class will be taught using a combination of activities, lectures, discussions, readings, in-class engagement activities, and essays. Your success in this course depends upon reading the material BEFORE classes, participating in the discussions, and finishing all assignments on time. All assignments will be posted in Canvas as well as online teaching materials.

Lectures
You should prepare for the lectures by reviewing the modules. You should engage in class by participating in the discussions. Roll will be taken at the beginning of class, and I reserve the right to mark you absent for leaving without being excused or disrupting class.

Assignments
Assignments will be hands-on labs and other skills-based assessments where possible.

Test & Projects
Tests may be proctored questions based on the reading, labs, and quizzes and may have hands-on skills-based assessments. Your project work will also be in this category and is the exception of when you can get help. Quizzes are to be completed in class during the time proctored. Passwords will be removed shortly after class starts. Giving someone the password is considered cheating. One quiz can be made up after the last quiz of the semester is given.

Final
A final exam will help you understand how ready you may be for a certification test. To prepare for this test, you should continue to play with and understand the many features available to architect systems in the cloud. Expect your grade to stay pretty much the same from the final. Most grades drop slightly with the final. The final may be substituted with an industry-standard exam.

Weekly Schedule

1	Intro & Module 0
2	Module 1 & 2
3	Module 3 & 4
4	Module 4 & 5 & 6
5	Module 6 & 7
6	Module 7 & 8 & 9
7	Module 9 & 10

8 Module 9 & 10 & 11
9 Module 9 & 10 & 11
10 Module 11 & 12 & 13
11 Module 13 & 14 & 15
12 15 & Project
13 Project
14 Project

Comprehensive Final - Industry Standard Test (CLF-02 AWS - Cloud Practitioner)

APPENDIX B

A survey that was calendared a week before the semester ended.

Question 1
We are interested in understanding how AWS Academy's uses in Information Technology (IT) and related fields.

In this course, we hope to understand better what helped you prepare for your certification test.

Please be assured that your data will be kept entirely confidential. Student data will remain anonymous and will only be analyzed and reported after aggregated with other responses. You are not required to participate in this research.

This research study has been reviewed and approved by the Institutional Review Board (IRB) at Brigham Young University-Hawaii. The study involves only minimal risks.

This survey, including the consent to participate is 12 questions and should take you around 10 minutes.

There are not direct benefits to you for taking this survey.

Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail assistant professor Jeff Strain jeff.strain@byuh.edu.

If you have questions regarding your rights as a participant in research projects, you may contact Dr. Boyd Timothy, Chair of the Institutional Review Board for Human Subjects, BYU–H Box , 55-220 Kulanui Street, Laie, HI 96762; phone: (808) 675-3931, boyd.timothy@byuh.edu.

By selecting yes, you agree to participate in the research. By selecting no, your data will not be used.

Group of answer choices
Yes - I consent to participate
No - I do not consent to participate

Question 2
Think about how you studied for the test. Please list in order of what helped you the most to the least to prepare for the test. Items you may have used could contain, but are not limited to.

eBook Readings
eBook Labs
eBook Chapter Quizzes
Playing in the Learner Lab
Playing in the eBook Sandbox
In-Class Quizzes
Practice Tests
Large Language Model like ChatGPT
Other

Question 3
Please explain why you think some of the things you mentioned above helped you prepare for the test. Please tell us what ones were helpful and in what ways.

Question 4
What problems did you have leading up to and while taking the exam?

Question 5
What would you have liked to know before taking the exam?

Question 6
What did you do, outside of the course, to prepare yourself to take the exam?

Question 7
We all know taking a test is stressful. Taking an industry-standard test is even more stressful.
What are some things that were done leading up to the test and while you were taking the test that helped make the experience less stressful?

Question 8
Is there something that would have stopped you from taking the test if not for the help you received from the university or the class?

Question 9
Is this your first industry exam, or have you taken one before? If you have taken them before, what ones?

Question 10
Is English your primary language?

Group of answer choices
True
False

Question 11
How many languages are you fluent in?

Question 12
What country are you a citizen of?