AWS Academy vs Microsoft Learn for Educators vs IBM Skills Academy: The Educators Choice

Lawrence Meyer, Jr.
School of Engineering & Technology
Miami Dade College
United States
lmeyerjr@mdc.edu

Elodie Billionniere
School of Engineering & Technology
Miami Dade College
United States
ebillion@mdc.edu

Abstract: In the recent years, higher education institutions have shown an increased interest in cloud computing. This emerging technology can no longer be ignored in the context of developing 21st century skills for students preparing for the workforce of tomorrow. The rapidly evolving nature of the cloud makes it a challenge keeping up with this technology. Continuous training is essential to stay abreast with ongoing changes and trends. There has been little discussion about cloud computing training opportunities for educators, propelling us to share our experiences and insights within multiple teaching and learning frameworks. The purpose of this paper is to review and compare faculty professional development provided by three leading cloud service providers. This paper compares these training opportunities for cloud computing at the introductory level through the lens of educators to evaluate their effectiveness for instructor education, skills, and teaching preparation. Discussion of their pedagogy, content knowledge, technology and assessments are provided. The paper closes by proposing improvements to enhance faculty professional development offerings in cloud computing.

Introduction

The movement to cloud technology was started in the late 1960s with the idea of an "intergalactic computer network" (Hey & Pápay, 2014). This creation of distributed networking of computers coupled with virtualization introduced by IBM in the '60s and '70s allowed for the creation and distribution of applications and services from one system to another with Salesforce being considered the leader in application distribution in the late '90s (Maguire, 2019). In 2002, Amazon realized the excess computing it had could be harnessed for sale and created it's Mechanical Turk service set, followed rapidly by Elastic Compute Cloud (EC2) effectively launching the widespread beginnings of public cloud services now referred to collectively as Amazon Web Services (AWS) (Moura & Hutchison, 2016).

Given the breadth of cloud platforms available, faculty professional development (FPD) was focused on the best options for future student employment. Using available cloud certifications and resources along with cloud market share and employment demand. While market share may be determined by income, corporate structure and reporting makes actual market share difficult to determine. The largest cloud computing companies, by market share are AWS, Microsoft, Google and IBM. AWS holds between 32% to 47.8% of the cloud market share, Microsoft Azure 19%, (although Office 365 is included), Google Cloud at 6% and IBM at 2% to 5% (Jones, 2020; Stalcup, 2020). It is noteworthy that AWS had a seven-year lead into the public cloud offering, as well as a similar lead in technical training options.

To maintain their lead and expand the cloud related opportunities, AWS rapidly releases feature updates, new products and industry certifications. For example, their relational database systems (RDS) updated 50 features in 2016, 80 features in 2017, and 100 features in 2018 (Benton, 2019). Those were only the RDS updates! Similarly, in 2019 there were 77 major feature releases across their cloud ecosystem including new offerings, updates and systems (Doyle & Le, 2019). AWS maintains its lead in the cloud computing field through custom enhanced hardware, infrastructure and software.

Other cloud providers are also releasing new features and options in their product streams, often specializing in market niches based on prior business models. IBM's CEO Arvind Krishna (2020) recently announced that they will spin-off its Managed Infrastructure Services unit of its Global Technology Services division into a new public company ("NewCo")." This creates two industry-leading companies, each with strategic focus and flexibility to drive client and shareholder value." The new cloud company will focus on hybrid-cloud technologies, or the hybrid cloud market and Artificial Intelligence (AI). Google is matching pace with implementation of better and faster microservice architectures, database improvements and microservice implementations.

After FPD in each system's cloud architecture and related services, this constantly evolving ecosystem of features for all platforms will require continual certification upkeep. The initial training and subsequent retraining are imperative for faculty teaching in the cloud-based technology fields to match the needs of a novice student's education with the current state of the technology and employment. This training also allows current workforce training and reskilling. According to the World Economic Forum there is a definite need to reskill professionals into the cloud environment and upskill others into current cloud tools, techniques and offerings. By 2025 cloud technology is in the top five of technologies adopted by IT organizations and is a required supporting technology for all of the others in the top five (World Economic Forum, 2020).

The top three cloud providers have each developed tools, platforms or hosted courses for learning their material. Often the training is designed for specific certification courses using a web portal for online and hybrid training. The three discussed in this paper are: (1) Amazon Academy; (2) Microsoft Learn for Educators - Azure Fundamentals; and (3) IBM Skills Academy. Each of the educator training starts their learning pathways with an introduction to core cloud concepts and their infrastructure. Each educator portal provides modular courses and certifications/badges with appropriate materials as needed for their platform and domain specific infrastructure.

AWS Academy – Cloud Practitioner

AWS is the early leader in the market for cloud computing. They started with Simple Storage Service (S3) then added in virtualized servers (Elastic Compute Cloud EC2) as their first cloud provisioned services. They have since expanded into databases, machine learning, artificial intelligence, and wholescale IT infrastructures. In order to support their platform with trained IT workers, AWS Academy was created for delivery of AWS technical (AWS Academy, n.d.).

Faculty members started their cloud journey by completing the AWS Cloud Foundations course as an entry level training toward the AWS Cloud Practitioner certification. This course consisted of videos, PowerPoint slides and hands-on labs prepared by lead Amazon technical professionals knowledgeable in the skills and best practices of the AWS environment. All the materials and labs are provided at no cost to the faculty member and run on a free virtualized environment allowing faculty to practice with no risk of cost overruns.

The course material covers four primary domains: (1) cloud concepts; (2) security and compliance, technology; (3) billing; and (4) pricing. Each of these domains is included on the test and the percentage of coverage ranges from 16% to 33%. To pass the certification exam, faculty need to have a minimum passing score of 700 out of 1000.

Once faculty completed the online training materials, faculty are led through a full review by an AWS Academy technical manager for all the sections and labs, including practice exam questions, test format, and techniques for passing the certification. Faculty are given a 50% discount voucher toward the certification exam. Once they have successfully passed the certification, faculty do a two-hour teach back to become an AWS Academy Accredited Educator, authorizing to teach using all the materials in the AWS Academy portal. The Train-the-Trainer pedagogy is designed to ensure that the instructor comprehends and can communicate clearly the Amazon Academy materials to their students. AWS Academy Accredited Educators deliver the same materials they trained with, as is, without any modifications. However, faculty can supplement the instruction materials with additional materials and labs at their leisure to fill their institutional needs and their cloudified courses. Furthermore, Amazon provides white papers, blogs, and FAQs for each domain and objective of the exam and all aspects of their cloud environment. These materials are heavily referenced in the training course and are freely available to everyone.

As the predominant leader in cloud technology, AWS Academy is consistently revamping and updating its courses to meet the needs of the new certifications and the changing environment of the AWS ecosystem. Overall, the materials design and techniques are highly effective for the teaching and learning of the educators.

Microsoft Learn for Educators - Azure Fundamentals

The Microsoft Learn for Educators is designed to provide fundamental in Azure and business application training curriculum and instructor teaching materials to institutions and faculty (Microsoft Learn, n.d.). The materials include, online training, official curriculum, course design, teaching and assessment guides.

The course material covers four primary domains: (1) cloud concepts; (2), core services and management tools; (3) security, privacy and compliance; and (4) pricing and support. Each of these domains is included on the test and the percentage of coverage ranges from 15% to 35%. To pass the certification exam, faculty need to have a minimum passing score of 700 out of 1000.

The Microsoft Learn for Educators training consists of video lectures, readings and hands-on labs in a sequence of short courses that cover all the material necessary for the Azure Fundamentals exam AZ-900. Supporting the materials are brief quizzes on each section of the material. This exam is focused on cloud business and IT infrastructure foundational cloud services and knowledge. This certificate is a beginner cloud certification for those new to cloud services and concepts.

After completion of the training, Microsoft provides a 100% discount voucher to take the certification. Additionally, faculty were provided with a one-day Train-the-Trainer workshop delivered by Microsoft instructors for Azure fundamentals. The workshop consists of a review by technically proficient Microsoft trainers covering aspects of the exam and how to effectively deliver the material in their cloudified courses.

As part of the requirements for accessing freely the certification materials, once certified, Microsoft requires faculty member to teach the course materials within one year. The materials and course structure for the Azure fundamentals are both newly created for institutional use and are currently undergoing revision to better suit institutional delivery.

IBM Skills Academy - Cloud Computing Practitioner

IBM Skills Academy is designed for all institutions world-wide to bridge standard course materials and instruction with current IBM job skills to make a graduate more marketable for current job prospects (IBM Skills Academy, n.d.). The focus of their courses is towards career paths based on job skills in order to support desired career paths. To support this material and instruction is provided to instruction faculty to keep their skills current.

The IBM Skills Academy Cloud Computing Practitioner training consisted of recorded lectures, PowerPoint slides, and short quizzes covering the material. The recorded lectures generally follow the PowerPoint slides provided slide by slide, allowing for different learning preferences to be applied in either reading or listening to the material. Unlike AWS and Azure certifications there is no comprehensive certification exam associated with this training.

The primary topics covered were (1) cloud business domains, (2) business case studies, (3) common cloud implementation patterns and types of cloud services, (4) AI in the cloud, (5) agile cloud design and build, and (6) teamwork and custom cloud application design. The content of the IBM Skills Academy is heavily business focused with the light introduction to the backend services of IBM Cloud. The technology demonstrated using the IBM live accounts and the cloud application was very similar to both Microsoft Azure and AWS platforms.

IBM Skills Academy also provided a two-week, half-day Train-the-Trainer workshop with updated content to cover the material and the labs to assist instructors in content delivery. IBM Skills Academy is working continuously to update the labs materials and applications used in these courses. The original labs utilized direct access to a free version of the IBM Cloud environment whereas the updated labs utilized an application to access the same material. All the work in the labs was done on live IBM cloud systems. There was a sufficient number of labs executable for discovering and learning how to deploy applications on the cloud. Certification as a Cloud Computing Practitioner Instructor requires an institutional commitment to teach the IBM course material within one year of training completion.

Findings

The material covered in each training course is fundamentally the same across all the three FPD programs. The training covers the foundations in cloud concepts, foundations of virtualization and/or virtualization environments, networking, databases, storage, security and business considerations, and terminology. Faculty who

participated in these training indicated the concepts and applications are synonymous with moving between programming languages. A basic business concept in one has analogous components in the others. It must be noted that AWS has a seven-year lead on developing environments and training for their materials. Therefore, if a faculty was to complete the Amazon Cloud Foundations training first, Microsoft Azure Fundamentals and IBM Cloud Computing Practitioner training are remarkably similar. Due to business needs, there is overlap in platform offerings, development and focus between the three training.

AWS and Microsoft Azure certifications and materials covered more technical aspects in the components of their respective systems. IBM's application interface labs demonstrated partial capabilities of IBM Cloud, however, did not significantly discuss its components or overarching architecture. Table 1 summarizes the primary features of the introductory cloud computing training courses for FPD across all three cloud providers.

	AWS Academy Cloud Foundations	Microsoft Learn for Educators Azure Fundamentals	IBM Skills Academy Cloud Computing Practitioner
Train-the-Trainer Delivery Mode	online (self-paced), hybrid, and in-person	online (self-paced)	online, hybrid, and in-person
Cost of Training	free	free	free
Educator Resources Portal	Comprehensive	comprehensive	limited
Curriculum	ready-to-use PowerPoints, videos, quizzes, white papers	ready-to-use PowerPoints, videos	ready-to-use PowerPoints
Hands-On Labs	many practice labs via Vocareum	few practice labs	application to interface with IBM services
Assessment	module quizzes and practice certification exam	module quizzes and practice certification exam	n/a
Project-Based Learning	yes	no	yes
Certification Exam	AWS Cloud Practitioner	Azure Fundamentals	n/a
Educator Digital Badge	Yes	no	yes
Prerequisite(s)	no	no	no, but IBM Design Thinking Practitioner is preferred
Accreditation	Yes	yes	yes
Exam Voucher	50% discount voucher	100% discount voucher	n/a
Teach Back for instructor accreditation	Yes	no	no

Table 1. Comparison Summary of the three faculty cloud training offerings

Faculty were surveyed upon completion of their FPD in cloud basics. The survey for AWS Academy included eight faculty with results as follows:
- 71% of faculty believed they were prepared for the certification
- 29% stated they were moderately prepared
- All faculty passed the certification exam in one (75%) or two (25%) attempts
- All the faculty did agree they thought the material made them feel comfortable to teach the courses required
- All faculty utilized a variety of additional online training platforms to prepare for their certifications given the significantly more technical nature of the AWS exams

The survey for Microsoft Learn included three faculty with results as follows:
- 67% found the material somewhat useful
- 33% found the material useful
- All faculty passed the certification exam in one (100%)
- Faculty noted that Microsoft's materials are thorough and well maintained
- Faculty desired more than the one or two provided labs

The survey for IBM Skills Academy included three faculty with results as follows:

- 67% found the material useful
- Faculty believed the student material needs to be totally reworked to be more useful for students
- Supporting applications were not current
- Most of the labs were spent trying to debug the application issues
- The PowerPoint materials was found to be very useful regarding instructions from an IT business perspective

Conclusions

Overall, the maturity of the AWS platform stands out amongst the other two offerings. AWS Academy has worked with faculty across multiple institutions for several years to refine its courses and materials. Faculty ability to access a full training environment for all significant AWS platforms, along with coordinated video lectures, PowerPoint slides and labs made AWS Academy the preferred learning opportunity. The ease of navigating the material, and the depth of coverage provided to practice and study for the certification exam is the best of all. AWS's labs are some of the best, providing clear instructions and a safe environment to practice. Additionally, AWS Academy provides a full team of instructional designers updating and maintaining all the materials in their courses. Most faculty members achieved additional AWS training and certifications in Solutions Architect, Developer, Security, and Big Data. Microsoft Azure training has solid course materials broken into separate units. Each unit allowed lecture and practice for the self-contained topic. Faculty found the navigation and progress indication confusing at times. The strength of the Microsoft Azure material is their solid coverage of basic cloud and business systems. This focus on business aspects of Azure is a nice addition for IT professionals in understanding business considerations.

IBM training platform feels scripted for internal or corporate IBM Cloud training, rather than faculty or college students. Their platform design, course material and navigation are significantly behind other cloud training platforms. The course focuses on business cases, and less on technical aspects of cloud offerings, present a more business-oriented overview of cloud technologies. The material training provides good coverage of cloud business and design thinking. For faculty professional development, this is better suited to an MIS or Business faculty member. Their technical training lags significantly behind the other two offerings. The education platform and labs need significant work to be useful in a classroom setting.

Based upon regional needs and marketplace demands, IT faculty professional development should consider the more technical and stringent AWS or business-oriented Microsoft Azure training as their starting point. Each of these programs are good at presenting fundamentals of cloud technology and platform specific IT training. Business and MIS faculty should consider either Microsoft Azure or IBM Cloud training for a more business-focused learning approach.

When looking at cloud technology, the cloud fundamentals by AWS covers and translates nicely into the Microsoft Azure and IBM Cloud fundamentals courses. The workforce of today often uses multiple clouds, not only internal clouds but external cloud providers in support of their business. This may necessitate the need for faculty trained in not just in one cloud platform but in multiple cloud offerings to meet local employment needs. Google Cloud is entering the training space with the addition of Coursera offerings in their cloud IT certifications and are next on the list for inclusion in cloud training. The ability for faculty to take training at one cloud provider and translate that to other cloud providers offerings can simplify the learning process. The importance for students today to know the fundamentals of a particular cloud, and the technical details of learning and working on additional cloud platforms is important. but how to take that knowledge across multiple systems cannot be overstated. Multi-cloud environments for multiple reasons are anticipated to become critical according to 69% of the respondents in a recent survey (Buckley, 2019; Piraino, n.d.). Faculty professional development in multi-cloud is fundamental to making this happen.

Acknowledgement

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