Learning Experience with AWS - A Pilot Study

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Abstract

This pilot study investigates the learning experiences of a four-member team of Master's students in Information Technology and Systems at the University of Canberra, Semester 2, 2024 using the Amazon Web Services (AWS) Skill Builder platform to develop cloud computing skills. The research aimed to explore how the platform influences students' skill development, confidence, and job readiness. To gather data, a pre-defined reflection journal in Google Form was used. Using a mixed-methods approach, the study combined quantitative data, such as time spent and assessment scores, with qualitative reflections to capture participants' personal experiences. Results indicate significant improvements in participants' cloud computing knowledge, with 83.3% of the participants progressing from beginner to intermediate skill levels. The study also identified key factors affecting the learning process, such as ease of navigation, course relevance to career goals, and challenges encountered with interactive elements. The findings suggest that cloud-based platforms like AWS can effectively enhance technical skills. However, it could benefit from improved user interfaces and more realistic course time estimates. These insights provide valuable implications for educators and institutions seeking to integrate cloud computing into their curricula, as well as for future research on the long-term impact of such platforms on career outcomes.

Keywords: AWS, AWS Skill Builder, Cloud Computing, Skill Development, Education**,** Reflective Learning, Cloud-Based Learning, Journaling

1. Introduction

In today’s rapidly evolving technological landscape, acquiring industry-relevant skills is essential for students to remain competitive and transition successfully into the workforce. Cloud-based learning platforms, such as Amazon Web Services (AWS) Skill Builder, offer over 600 free courses designed to help individuals develop cloud computing expertise and technical proficiency. These resources not only prepare learners for AWS certifications but also enhance their skills in areas that align with industry demands (AWS, 2024c).

The University of Canberra has partnered with AWS to address these industry needs by integrating cloud-based learning into its curriculum, focusing on skill development and certification (Awasthy, 2023). However, while this collaboration has contributed to building technical capabilities, it has not fully explored the individual learning experiences of students as they engage with these platforms. Understanding these experiences is critical for determining how cloud-based platforms contribute to students' skill acquisition, confidence building, and overall job readiness.

This pilot study, conducted as part of the Technology Capstone Research Project for a group of Master’s students in Information Technology and Systems at the University of Canberra,

seeks to address this gap. The study aims to document students' learning experiences with AWS Skill Builder, focusing on how the platform influences factors such as ease of use, skill confidence, relevance to career objectives, and preparedness for the workforce. By employing both qualitative and quantitative methods, combining personal insights gathered through reflection journals with measurable data such as time spent on the platform and difficulty ratings, the study will offer a comprehensive analysis of the learning process. This dual approach will not only highlight the technical skills acquired but also capture the subjective experiences that shape the learning journey.

The findings from this research will provide valuable insights for educators, students, and researchers regarding the effectiveness of cloud-based learning platforms like AWS Skill Builder. By systematically analyzing both quantitative data (e.g., topics covered, time spent) and qualitative data (e.g., reflections on challenges and confidence building), the study will present a nuanced understanding of how these platforms support skill development. For educators, the results will inform strategies for better integrating industry-relevant platforms into curricula, while for students, the research will illuminate key factors that can enhance their learning experiences. Furthermore, this study will serve as a foundation for future research to assess the long-term impact of cloud-based platforms on career outcomes, filling a critical gap in the existing literature.

To explore this gap, it is crucial to examine how cloud-based learning platforms are currently being utilized in educational settings, as well as the opportunities and challenges they present. The following literature review provides an overview of the role of cloud computing and cloud-based learning platforms in education, focusing on platforms like AWS and their impact on skill development, career readiness, and reflective learning practices.

2. Literature Review

A strong focus on technological and technical education is crucial for preparing the next generation for future employment (Lindsay et al., 2024). As technology continues to evolve, educational systems need to equip students with both transferable and technical skills to meet the changing demands of industries (Heath, 2020). Aligning educational curricula with job market needs is essential for ensuring that students are prepared for the skills and competencies required by businesses (Goulart et al., 2021).

The modern educational landscape has increasingly adopted digital technologies as valuable tools for enhancing learning experiences. Interactive and engaging tools, such as cloud computing platforms, have revolutionized traditional classroom settings (Wu & Plakhtii, 2021; Haleem et al., 2022). Cloud computing has opened new opportunities for students to engage with cutting-edge technologies critical to the global workforce (Ka, 2023). Its ability to provide scalable, on-demand resources has significantly enhanced educational outcomes by supporting both students and educators (Lakshminarayanan et al., 2013).

Cloud computing has become integral to modern education. Platforms like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud offer educational resources, training, and certification to help students build skills relevant to the job market (Amazon, 2024; Google, 2024; Microsoft, 2024; IBM, 2024). Cloud platforms not only provide students with theoretical knowledge but also allow hands-on, scenario-based learning experiences that bridge the gap between theory and practical application (Flood & Hall, 2022). AWS offers several platforms tailored to different educational needs: AWS Educate, AWS Academy, and AWS Skill Builder (AWS, 2024b; AWS, 2024a; AWS, 2024c). These platforms enable flexible

learning environments that enhance both technical proficiency and accessibility for students (Thavi et al., 2021; Milošević et al., 2022).

Despite the benefits, there is limited research on the long-term career outcomes of students who engage with cloud platforms like AWS. Moreover, the role of reflective learning, particularly through journaling, has not been widely explored in relation to these platforms. Reflective learning is known to deepen students' understanding of complex technical concepts (Veine et al., 2020). Investigating how platforms like AWS Skill Builder foster reflective learning could reveal new insights into their educational impact.

Collaboration between universities and industries has become increasingly important for preparing students for the workforce. Studies show that industry partnerships enhance graduate employability by aligning educational content with job market demands (Awasthy, 2023; Chew et al., 2021; Ha, 2021). This alignment is evident in the integration of cloud computing courses, particularly AWS, into higher education programs. For example, in Georgia, higher education institutions have introduced AWS courses to meet the growing demand for cloud specialists in the global job market (Kantaria et al., 2020). Several case studies highlight the success of university-industry collaborations in enhancing student outcomes. Coventry University has integrated AWS into its Cloud Computing B.Sc. program (Flood & Hall, 2022), while the University of Canberra has embedded AWS-developed content into one of its units (Awasthy, 2023). At Ara Institute of Canterbury, AWS Academy courses were adopted to align with industry standards, improving students' technical proficiency and job readiness (Gokop Goteng et al., 2022). The success of these collaborations was measured through student assessments, certification achievements, feedback, and networking opportunities (Awasthy, 2023; Segec et al., 2021).

While the adoption of cloud computing in education offers significant advantages, there are also challenges. One primary concern is the over-reliance on vendor-specific content, such as AWS, which may limit students' exposure to a broader range of technologies and critical thinking opportunities (Correia & Tasker, 2022; Milošević et al., 2022). By focusing too narrowly on one platform, students may miss out on learning other valuable tools that are relevant across the technology sector. Additionally, resource constraints, institutional resistance, and data privacy concerns pose further barriers to the effective adoption of cloud platforms in education (Al-Sharafi et al., 2021).

To address these challenges, educational institutions must strike a balance between incorporating industry-relevant skills and broader educational goals (Xinming, 2023). This requires thoughtful curriculum design that ensures students are exposed to a variety of platforms and technologies while still gaining the practical, job-ready skills that platforms like AWS offer.

Despite the growing use of cloud platforms in education, there are gaps in the literature concerning their long-term impact on students’ career development. Research has yet to fully explore how platforms like AWS contribute to skill retention, career advancement, and job readiness in the long term. Furthermore, there is a lack of studies examining the role of reflective learning in cloud-based education. Reflective learning, particularly through techniques like journaling, has been shown to enhance students' understanding of complex concepts by encouraging critical thinking and self-assessment (Veine et al., 2020).

Investigating the impact of reflective learning on students’ experiences with AWS Skill Builder could provide valuable insights into how this tool influences students’ learning outcomes.

Understanding the reflective process and how it shapes technical skill acquisition may help educators design more effective, student-centred learning environments

3. Research Questions

In today's rapidly evolving technological landscape, cloud computing has become a critical skill for students pursuing careers in Information Technology (IT). The AWS Skill Builder platform offers an opportunity for students to develop cloud computing proficiency. However, the effectiveness of this platform in skill development, the challenges students face, and how user experience factors influence overall satisfaction remain underexplored.
To address these gaps, this study focuses on the following research questions:

1. *How does the AWS Skill Builder platform contribute to the development of cloud computing skills among university students?*
2. *What challenges do students face when learning cloud computing through AWS, and how are these challenges overcome?*
3. *What is the correlation between the overall platform experience and other metrics such as ease of use, platform support, and course content?*

These questions aim to assess the AWS platform's role in enhancing students' technical skills, explore obstacles learners encounter, and investigate the relationship between user experience factors and overall satisfaction with the platform.

4. Methodology

This study used a mixed-methods approach, combining both quantitative and qualitative data collection to provide a comprehensive view of the learning experiences on the AWS Skill Builder platform. The mixed-methods approach was chosen to capture measurable insights from quantitative data (e.g., time spent, topics covered, skill confidence levels) while also exploring deeper personal experiences through qualitative reflections (Taherdoost, 2022). This combination allowed for a thorough understanding of how AWS Skill Builder contributes to skill development and job readiness. Purely quantitative or qualitative designs were considered but rejected, as a quantitative-only design would lack depth in understanding personal challenges and experiences, and a qualitative-only approach might miss important measurable indicators such as skill improvement and other important metrics.

Participants

The study included four participants, all of whom are project team members engaged in learning on the AWS Skill Builder platform. As active participants in the project, we documented our learning experiences as part of the research process.

Data Collection

The primary data are collected from four participants engaged with the AWS Skill Builder.

Quantitative Data

The quantitative data collected in this study includes metrics related to the use of the AWS Skill Builder platform:

- Course duration (in hours)
- Initial and final knowledge levels (self-reported)

- Ease of navigation and usability (rated on a scale of 1 to 5)
- Ratings of interactive elements and course organization (on a scale of 1 to 5)
- Relevance to career aspirations (on a scale of 1 to 5)
- Motivation to continue learning (on a scale of 1 to 5)
- Number of attempts taken for knowledge assessments
- Scores on knowledge assessments (percentage).
- Confidence levels in applying newly acquired skills (on a scale of 1 to 5)

Participants manually recorded this data using a journal template in Google Form after completing each course. The data included self-reported metrics as well as scores from knowledge assessments provided by the AWS platform.

Qualitative Data

The qualitative data focused on reflections from participants about the learning experiences, including:

- Challenges faced during the learning process and how they were overcome.
- Feedback on whether participants would recommend the course to others and the reasoning behind it.

These reflections were submitted after each course using the standardized Google Form. The journaling process using the Google Form ensured that qualitative data is collected consistently across all participants.

Data Collection Tools

The primary tools used for data collection are:

- **Google Form** for capturing both qualitative and quantitative data through a predefined reflection journal template (Appendix 1).
- **AWS Skill Builder** for course content, learning modules, and knowledge assessments.

To ensure consistency in data collection, the Google Form template included mandatory questions that all participants must complete. This approach standardized the type and format of data collected from each participant.

Data Cleaning

The raw data from the journal template are cleaned manually in excel and using Python in Jupyter Notebook. In excel, the column names are renamed from long sentence (mostly in questions) to short ones. For instance, the column “6. What is your level of knowledge in the subject matter or the course you took before beginning the course?” was renamed to “Subject_Knowledge_Before”. The data cleaning steps in Python are available in appendix 2

Data Analysis

Data Analysis Tools

For data analysis, we have considered using Excel, R in R Studio and Python in Jupyter Notebook. Although the size of the data is small, we have decided to use Python since two members of our group are familiar in analysing data using Python. The Python Jupyter Notebook used for data analysis is attached in appendix 2.

Quantitative Analysis

Quantitative data were analysed using descriptive statistics and charts. The descriptive statistics included calculating the number of topics covered, descriptive statistics of course duration, time taken to complete the course, first attempt score, and number of attempts made to complete the course. The charts include pie chart to check the subject knowledge before and after completing the course, bar graphs for knowledge and skills acquired relevancy with career aspiration, and confidence levels of participants in applying the skills. It also includes a correlation heatmap between various user experience factors and the overall perception of the platform. The goal was to quantify participants' learning progress and the effectiveness of the platform in supporting knowledge and skills development.

Qualitative Analysis

Thematic analysis was employed to analyse qualitative data. Reflections from participants were reviewed to identify recurring themes and patterns, such as challenges encountered during the learning process and whether the participants will recommend the course to others with reasoning. These themes provided insights into the personal aspects of the learning process.

Ethical Considerations

All participants have provided consent for their data to be used in the study, as it is a part of our educational experience. To maintain confidentiality and anonymity, participants' data were anonymized in the final report, and no personal identifiers are used. Data will be presented in aggregate form to protect individual privacy.

Limitations

Several limitations are acknowledged in this methodology. The reliance on self-reported data may introduce biases, as participants may unconsciously over or under-report certain metrics. Additionally, the sample size is small, being limited to the four members of the project team, which may affect the generalizability of the findings. Finally, variations in participant engagement with the AWS platform could influence the results and may not fully represent broader learning experiences.

Research Process Overview

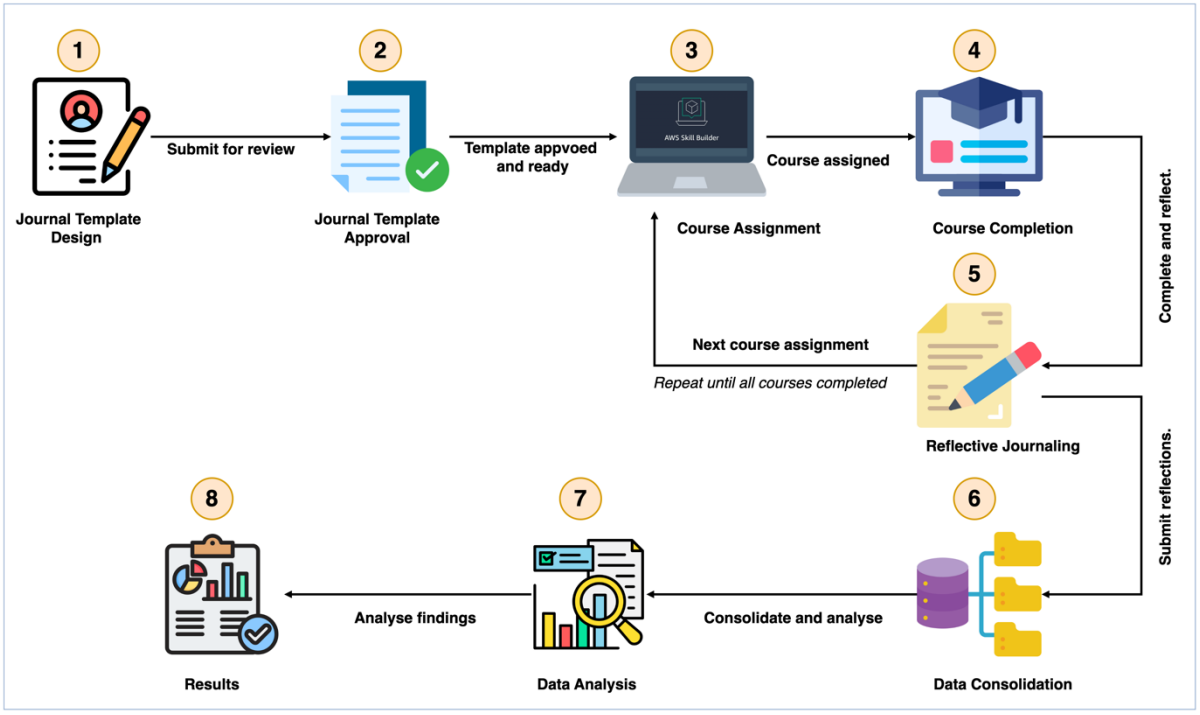

Figure 1: Research Process. The diagram has been created using resource from https://flaticon.com/

Figure 1 outlines the research process undertaken in our study. It visually represents the sequential stages involved in our research, from the initial design of the journal template by the project group to the final analysis of collected data and presentation of findings.

The process began with the project group designing a journal template. This template was intended to capture both quantitative and qualitative data from the participants as they engage with the AWS Skill Builder courses.

Once the journal template was designed, it was submitted to the project sponsor for feedback. The sponsor reviewed the template to ensure it meets the necessary criteria and standards for the research objectives. After making required modifications, the template was approved by the sponsor.

Following the approval of the journal template, the project sponsor assigned specific AWS Skill Builder courses to the group members. These assignments were tailored to align with the learning objectives and the research needs.

Group members then proceeded to complete the assigned courses on the AWS Skill Builder platform. This involved engaging with the course content and completing any assessments.

After completing each course, group members were required to fill out the previously designed journal template. This reflection captured their learning experiences, challenges faced, and any insights gained during the course. This step was crucial for gathering both structured quantitative data and open-ended qualitative feedback.

The data collected from all group members through the journal templates were then consolidated. This consolidation involved compiling all reflections and quantitative metrics gathered during the course engagements into a single dataset for analysis.

With the consolidated data in hand, the next step was to analyse using statistical methods to interpret quantitative data and thematic analysis to extract themes and patterns from qualitative reflections.

The final stage involved interpreting the data analysis to produce findings and results. These findings revealed how effectively the AWS Skill Builder platform facilitated skill development and learning among the group members. The results are then documented in the research paper, providing evidence-based conclusions about the learning experiences and the impact of the AWS Skill Builder platform.

5. Findings

Participants successfully completed 6 unique Cloud Computing courses as shown in Table 1 on the AWS Skill Builder platform, resulting in a total of 24 responses as depicted in Figure 2. These courses covered foundational to advanced topics varying in complexity and subject matter.

SL	Course Title
1	Becoming a Cloud Practitioner Part 1 - Cloud Basics
2	Becoming a Cloud Practitioner Part 2 - Compute, Networking, and Account Strategies
3	Becoming a Cloud Practitioner Part 3 - Identities, Security, and Monitoring the AWS Cloud
4	Becoming a Cloud Practitioner Part 4 - Advanced Cloud Services
5	AWS Cloud Practitioner Essentials
6	AWS Technical Essentials

Table 1: Cloud Computing course completed by the participants in sequence of engagement.

```
# Print number of rows and columns
rows, columns = df.shape
print(f"Number of rows: {rows}")
print(f"Number of columns: {columns}")
```

```
Number of rows: 24
Number of columns: 27
```

Figure 2: Number of rows and columns in the dataset.

To compare the time spent on learning different Cloud Computing course in AWS Skill Builder, the course duration given as per AWS Skill Builder and the actual time spent by the participants are analysed. Figure 3 shows the descriptive statistics of the course duration as per AWS Skill Builder and the time taken by participants to complete the courses.

```
Course Duration Descriptive Statistics:
count    24.00000
mean      3.95000
std       1.50795
min       2.45000
25%       2.75000
50%       3.75000
75%       4.00000
max       7.00000
Name: Course_Duration_Hours, dtype: float64
```

```
Time Taken to complete the course Descriptive Statistics:
count    24.000000
mean      4.614583
std       2.427753
min       2.000000
25%       2.882500
50%       4.050000
75%       6.017500
max      10.280000
Name: Hours_Taken_To_Complete_Course, dtype: float64
```

Figure 3: Descriptive Statistical Analysis of Course Duration and Time Taken to Complete the Course

The maximum duration for the course as per AWS was 7 hours and minimum was 2.45 hours with an average of 3.95 hours. Most of the course duration ranged from 2.75 hours to 4 hours.

The time participants spent completing the courses was notably longer than the estimated durations provided by AWS. As shown in Figure 3, while the mean estimated duration for the courses was 4.6 hours, the actual time participants spent completing them varied significantly with the minimum time being 2 hours and the maximum time extending to 10.2 hours. This discrepancy suggests that the course content was more challenging than anticipated, requiring additional time for learners to fully grasp the material. The variation in completion times also reflects the differences in individual learning paces and the complexity of the topics covered in the courses. Participants spent from 2.88 to 6.01 hours in completing different courses.

To measure the subject knowledge before and after, the self-reported knowledge level of each participant was analysed using the pie chart as shown in Figure 4.

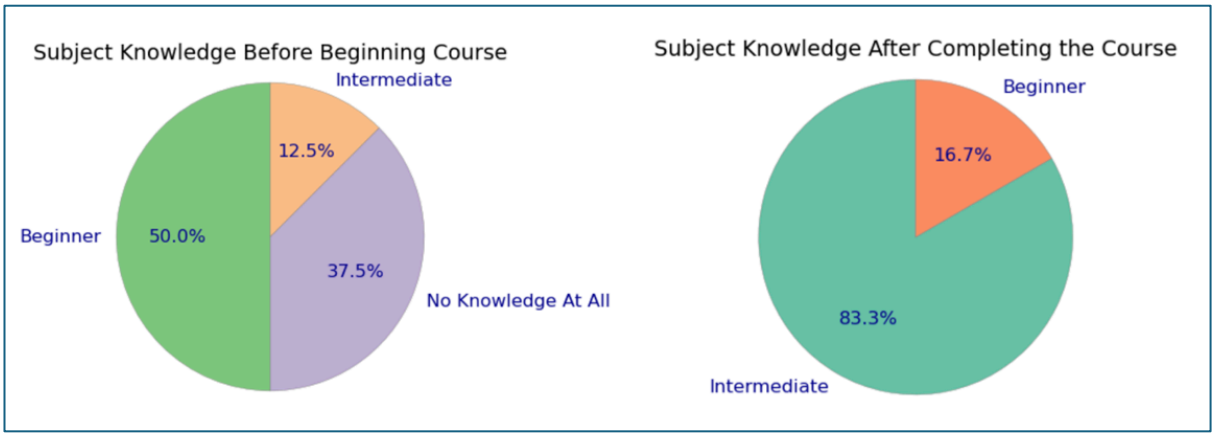

Figure 4: Pie charts showing the subject knowledge before and after the course.

Before beginning the courses, participants rated their knowledge of cloud computing as primarily beginner-level (50%) followed by “No Knowledge At All” (37.5%). Post-course ratings demonstrated significant improvement, with 83.3% of participants indicating they had progressed to “Intermediate”.

The actual understanding of the course content was collected on a scale of 1 to 5 and analysed using a bar chart depicted in Figure 5. Participants reported a high level of understanding of the course content after completion with 19 responses from the participants rating “Significant Improvement”. This suggests that the courses were effective in conveying essential concepts in cloud computing.

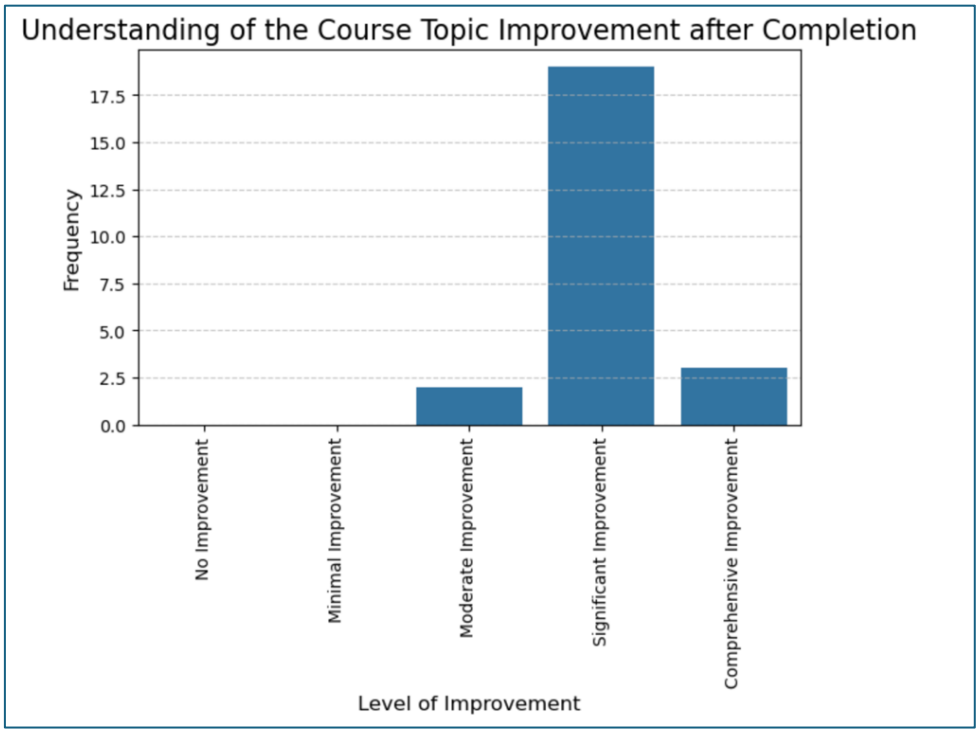

Figure 5: Bar chart showing the understanding of the course topic improvement after completion.

The platform experience was analysed by examining the correlation between various user experience factors and the overall perception of the platform. The correlation matrix in Figure 6 revealed several notable relationships. “Ease of Navigation” showed a strong positive correlation (0.69) with overall platform experience, suggesting that smoother navigation significantly enhances user satisfaction. “Content Organization” also exhibited a positive correlation (0.49), indicating that well-organized content substantially improves the user experience. On the other hand, “Usability of Interactive Elements” had a negative correlation (-0.22), implying that the more complex or difficult the interactive elements were for users, the worse their overall experience became. Similarly, “Platform Support for Learning” showed a negative correlation (-0.15), suggesting that the current support mechanisms may be insufficient or could detract from the user experience. “Course Engagement“ showed a positive correlation (0.45), highlighting that more engaging course content positively influences the overall platform experience. Furthermore, “Motivation to Learn More” displayed a positive correlation (0.49), meaning that users who found the platform engaging and user-friendly were more motivated to continue their learning journey. Lastly, “First Attempt Score” had a weak positive correlation (0.11), indicating only a slight relationship between overall platform experience and participants' performance on their first assessments.

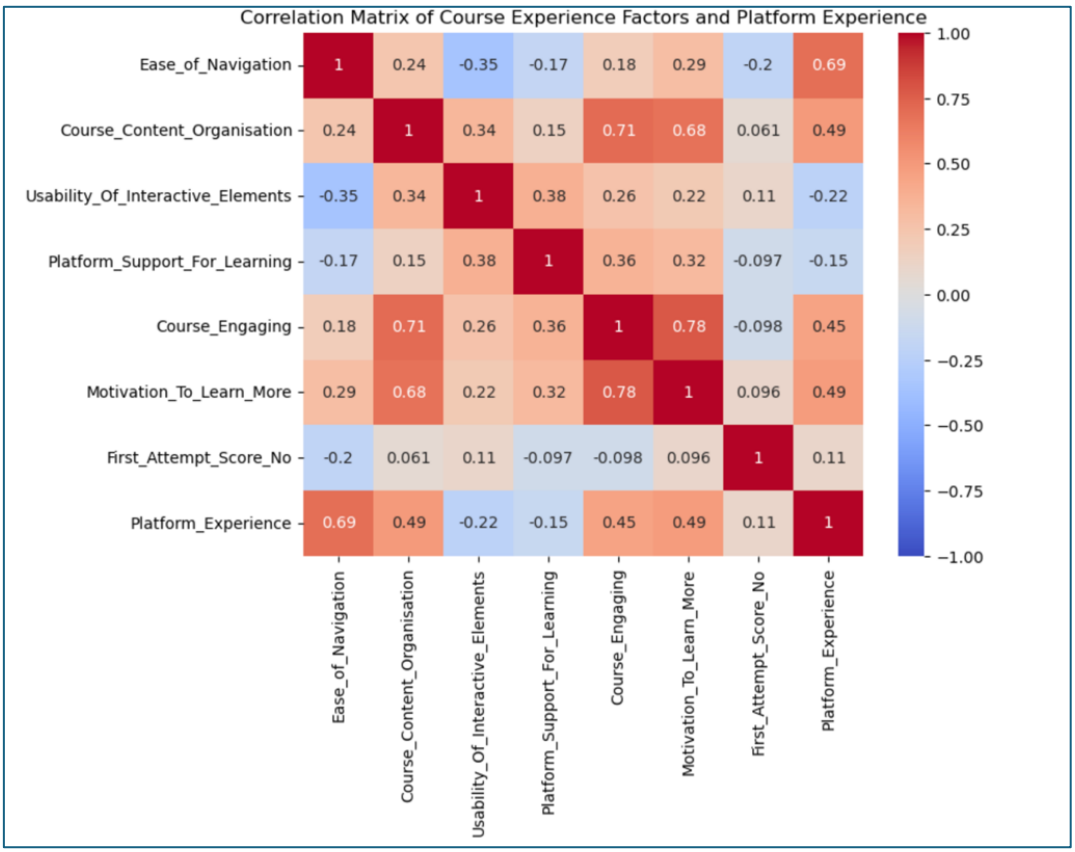

Figure 6: Correlation heatmap between various user experience factors and the overall platform experience.

The relevance of the skills acquired through the AWS courses to participants' career aspirations was measured and the results are depicted in Figure 7. A significant majority of participants found the skills “Very Relevant” or “Extremely Relevant” to their career goals, with each of these categories garnering 37.5% of responses. This indicates that most of the participants (75%) perceive a direct benefit from the courses in relation to their professional development. Conversely, a smaller segment of participants viewed the skills as “Not Relevant”, “Slightly Relevant”, or “Moderately Relevant”, with each of these categories receiving only 8.3% of the responses. This distribution suggests that while the courses are highly applicable and beneficial to most learners, a minority did not perceive the skills as closely aligned with their career aspiration.

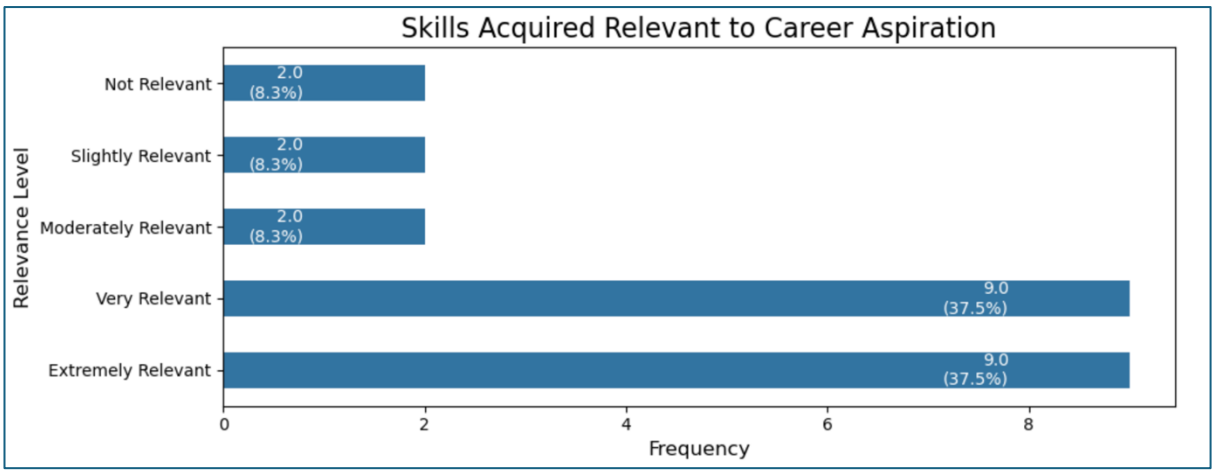

Figure 7: Bar chart showing the relevancy of knowledge and skills acquired to career aspiration.

The bar chart in Figure 8 illustrates the relevance of knowledge and skills acquired from different courses to career aspirations, arranged in vertical order according to when they were taken from left to right. Initially, perceptions of relevance varied, with one participant finding the first two courses "Not Relevant" while others rated them as "Very Relevant" and "Extremely Relevant." As participants advanced through the courses, the relevance shifted slightly with two responses at "Slightly Relevant" and most finding the courses "Very Relevant" and "Extremely Relevant." In the final two courses, the perception of relevance increased with two responses at "Moderately Relevant" and "Very Relevant," and four responses categorizing them as "Extremely Relevant." The change in perception reflect participants' growing understanding and engagement, as they recognize the relevance of course material to real-world career applications.

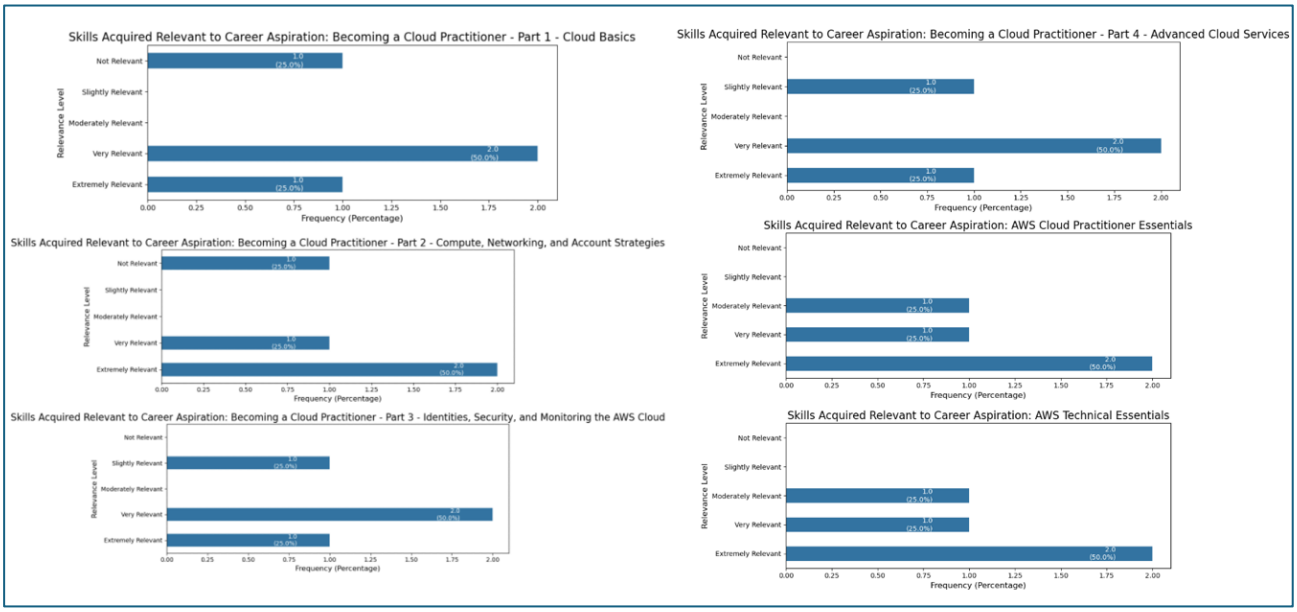

Figure 8: Bar chart showing the relevancy of knowledge and skills acquired from different courses to career aspiration in the order they are taken vertically.

Figure 9 shows the bar chart for assessing participants' confidence in applying the skills learned from AWS courses. The data revealed that most of the participants felt "Confident" in their ability to apply these skills effectively in their future professional roles with 15 responses (62.5%) rating as “Confident”. Additionally, 29.2% rated their confidence as "Moderately Confident," suggesting they generally feel prepared but may have some reservations about their full capabilities. Only a small proportion, 8.3%, reported high confidence level. This distribution highlights that most participants are well-prepared to utilize their new skills.

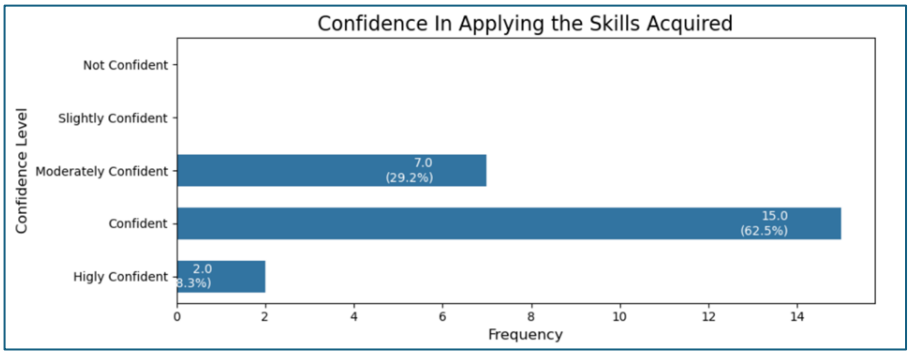

Figure 9: Bar chart showing the confidence in applying the skills acquired in future.

Thematic analysis of challenges encountered and course recommendation to others are carried out to gain insights into personal aspects of the learning process.

Participants encountered several challenges while navigating the AWS course simulations and content, which varied in complexity and nature. Many participants struggled initially with the overwhelming amount of information required to complete the exercises effectively. One participant mentioned, *"In the module, there was so much information to follow and memorize to do the exercise part. But when I figured out there is a Hint button to get hints, that helped me overcome the challenges."* The 'Hint' button proved to be a crucial aid for learners, offering timely guidance and enabling them to better manage the information load.

Another challenge commonly faced was the placement of simulations at the beginning of courses, which led to confusion for participants who had not yet gone through the foundational lessons. One participant shared, *"I started with simulations since it was placed at the beginning of the course and had some difficulty in understanding the instructions. But as I progressed through the course, I realized that we could go to the simulation after learning the lessons. After learning the lessons and going back to the simulation helped in working with the simulation."* This suggests that sequencing the simulations after theoretical lessons could improve the learning experience. Similarly, another participant highlighted their confusion with content organization, stating, *"At first, I was a little confused with the content organization, due to which I completed the simulation part before the actual course had begun. Later, I realized it and then connected my simulation experience with the actual course content, and I could connect the dots well."*

User interface (UI) challenges were also a recurring theme. Many participants found the platform's UI unintuitive, particularly when navigating through the course. One learner noted, *"Initially, navigation was quite frustrating as I couldn't go back, and I was closing the tabs to get out, but later I figured it out."* Another shared, *"UI is not good, and I don't feel comfortable with it,"* although over time, participants adapted to the interface, which alleviated initial frustrations. One participant mentioned, *"I have got familiar with the UI now, so it's easy now, but initially, it was not easy."*

Participants also faced challenges with quizzes, where similar questions and closely related answer choices required them to review content multiple times. One participant stated, *"While doing the quiz, I found most of the questions are the same, and the choices are all relevant. I had to go back to modules to double-check the answer."* This issue was particularly notable for those who were new to AWS, which proved difficult at first but became clearer with additional study time.

Time management was another significant challenge, with participants often needing much longer than expected to complete the courses. One participant remarked, *"The only challenge I faced was the time needed to complete the course. The course duration is 4 hours, but it took me more than 10 hours. Since the course is divided into different modules, I tried completing 1 or 2 modules every time I continued with the course."* This sentiment was echoed by others, with some needing to *"cut sleep time"* to fit the course into their schedules.

The participants' recommendations regarding the AWS course varied, with clear distinctions emerging between those who would recommend the course and those who would not, based on its relevance to specific career paths or interests in cloud computing.

Recommendations in Favor ("Yes")

From the reflections, some participants expressed strong support for recommending the AWS course, citing its comprehensive coverage in cloud computing. Several data entries highlighted the course as highly beneficial for beginners with no prior knowledge of AWS, stating that the platform provides an excellent starting point for anyone looking to enter the field of cloud computing. Others recommended the course specifically for those interested in cloud-related careers or roles that involve AWS, emphasizing that the course offers essential knowledge that could be critical for future job opportunities. One participant noted, "*Yes, this course will be very important to someone who is interested in Cloud Computing,*" reflecting a common sentiment that the course is invaluable for individuals targeting a career in this specific domain. Additional endorsements came from participants who appreciated the course for teaching "lots of new things related to cloud computing," making it a must-have skill for IT professionals.

Recommendations Against ("No")

Conversely, some participants were less inclined to recommend the course universally, with their reluctance often tied to the course's specificity to AWS or its applicability only to certain technical backgrounds. One respondent commented, "*No, it was of no use as it is only applicable to those who want to work in AWS,*" suggesting that the course's utility is limited if one's career does not directly involve AWS technologies. Another participant stated, "*I would only recommend the course to who has basic knowledge of how computer networks work, OS, servers and are interested in Cloud Computing*," indicating that the course may not be suitable for those without a foundational understanding of technical concepts.

A few responses were conditional, depending on the audience's specific interest in AWS or Amazon, with statements like, "*It depends on the people asking me these questions, if they are into Amazon and AWS then yes*."

At the end of each AWS courses, it requires a minimum 80% in the assessment. Participants are allowed to attempt multiple times. The analysis of the first attempt score was carried out to check the participants understanding of the topic over the period of engagement with AWS Skill Builder as shown in Figure 10.

```
First Score Attempt Analysis
count     24.00000
mean      74.62500
std       19.27786
min       33.00000
25%       64.25000
50%       78.00000
75%       90.50000
max      100.00000
Name: First_Attempt_Score_No, dtype: float64
```

Figure 10: Descriptive statistical analysis of first attempt score.

It highlights a wide range of outcomes that underscore the varied knowledge levels among learners. The mean score was 74.62%, indicating that the average participant did not meet the passing mark of 80% on their first attempt as required by AWS. The standard deviation of 19.27% points to significant variability in scores, demonstrating diverse levels of understanding. The minimum score recorded was a low 33%, suggesting substantial challenges or gaps in prerequisite knowledge for some learners. Conversely, the maximum score achieved was 100%, showcasing that some participants were exceptionally knowledgeable. Furthermore, the interquartile range from the 25th percentile at 64.25% to the 75th percentile at 90.50% reveals that while half of the participants scored between these figures, a notable percentage did not achieve scores high enough to pass on their first attempt.

6. Discussion

Based on the findings, the following discussion will address their implications, focusing on how these results contribute to understanding the learning experiences with the AWS Skill Builder platform and their impact on skill development.

The findings from this study highlight the effectiveness of the AWS Skill Builder platform in enhancing participants' understanding of cloud. The courses covered from basic to advance topics in AWS Cloud Computing.

The study revealed a significant difference between the estimated course durations provided by AWS and the actual time participants took to complete them. While AWS estimated an average of 4.6 hours, participants' completion times ranged from 2 to 10.2 hours, indicating that the course material was more challenging than anticipated. This discrepancy highlights two factors: individual learning paces and the complexity of cloud computing topics, both of which contributed to the extended completion times. These findings suggest that course duration estimates should account for learning variability and topic difficulty.

The findings indicate a significant improvement in participants' cloud computing knowledge after completing AWS courses. Initially, 50% of the participants rated their knowledge as beginner and 37.5% having no knowledge. After the completion of courses, 83.3% reported advancing to intermediate. This suggests that the AWS courses were effective in bridging knowledge gaps, allowing participants to progress in their understanding of cloud computing. The improvement highlights the platform's ability to support learners in building foundational to advanced knowledge.

The findings show that the AWS courses were highly effective in conveying cloud computing concepts, as 19 responses rated a significant improvement in their understanding of the subject after completion.

The analysis of the platform experience highlights key factors influencing users' overall perception of the AWS learning platform. The strong positive correlation (0.69) between “Ease of navigation” and “Platform Experience” indicates that when users can navigate the platform smoothly, their experience is significantly enhanced. Similarly, positive correlation (0.49) with “Content Organization” suggests that well-structured and logically organized content plays an important role in improving user experience. These findings underscore the importance of designing intuitive and well-organized platforms for optimal user satisfaction on the platform.

The negative correlation (-0.22) between “Usability of Interactive Elements” and “Platform Experience” indicates that when interactive elements were complex or difficult to use, the overall platform experience worsened. Since the only interactive elements was the simulation part, that might have contributed to the negative learning experience as reflected in the challenges participants reported. Similarly, “Platform Support for Learning” had a negative correlation (-0.15). This could because of the way our question was framed “Did the platform offer sufficient support for learning (Q&A, Discussion Forum, Note Taking, etc.)?” and none are present on the platform.

Other relationships include the positive correlation between “Course Engagement” (0.45) and “Motivation to Learn More” (0.49) with overall platform experience. These findings highlight that engaging content, and a user-friendly platform motivate users to continue their learning journey. Interestingly, the “First Attempt Score” showed only a weak positive correlation (0.11), suggesting that users' performance on their first assessments has little impact on their overall platform experience, possibly indicating that other factors, such as ease of use and engagement, are more important.

Most participants found the AWS courses to be highly relevant to their career aspirations. The courses appear to provide substantial value in terms of career development with 75% of respondents indicating that the skills acquired were either “Very Relevant” or “Extremely Relevant” to their professional goals. This positive outcome highlights the practical applicability of the AWS courses in equipping learners with skills that align with industry needs and career advancement. However, a small proportion of participants (8.3%) found the courses only “Slightly” or “Moderately” relevant, or “Not Relevant At All”. This could indicate a mismatch between the course content and the specific career paths or professional goals of a minority of learners.

The findings indicate that the AWS courses effectively instil confidence in most participants when it comes to applying their newly acquired skills in professional settings. A substantial 62.5% of respondents reported feeling "Confident," suggesting that the courses successfully equip learners with practical and applicable knowledge that they are ready to use in their careers. Additionally, 29.2% expressed being "Moderately Confident," indicating that while they generally feel prepared, they may still have some uncertainties about fully leveraging the skills in real-world scenarios. 8.3% of the responses indicated having higher confidence level in applying the acquired skills. This indicates that the AWS courses are broadly effective in skilling.

The challenges encountered by participants in navigating the AWS courses highlight several areas where the learning experience could be improved. A common issue was the overwhelming amount of information in the exercises, which initially made it difficult for participants to complete tasks effectively. The availability of a 'Hint' button proved to be a valuable resource, helping learners manage the information load and proceed with greater confidence. This suggests that clearer guidance and support mechanisms could benefit users, particularly in managing complex content. Another significant challenge was the placement of simulations early in the courses, which led to confusion for participants who had not yet absorbed the foundational lessons. Several participants noted that starting with simulations before fully understanding the course material made the tasks more difficult. However, revisiting simulations after completing the theoretical sections helped participants make better sense of the exercises. This feedback suggests that restructuring the course sequence, with simulations placed after the foundational lessons, could improve the learning flow and reduce confusion. User interface (UI) difficulties were also a recurring theme, with many participants finding the platform unintuitive at first. Navigation issues, such as being

unable to go back to previous sections easily, added to the frustration. Although participants adapted to the UI over time, these initial difficulties detracted from the learning experience. A more intuitive and user-friendly design would likely enhance the overall usability of the platform and reduce the initial learning curve for users. Quizzes posed another challenge, especially for those new to AWS. Similar questions with closely related answer choices required participants to review course materials multiple times to identify the correct answers. While this approach might encourage deeper engagement with the content, it also increased the difficulty level, especially for less experienced learners. Time management emerged as a significant challenge, with participants often needing more time than expected to complete the courses. Despite the estimated course duration being 4 hours, some reported taking over 10 hours to finish, indicating that the complexity and depth of the material required more time for understanding and practice. This also affected participants' schedules, with some needing to adjust their routines, including sacrificing sleep. Offering more realistic time estimates may help learners manage their time more effectively and reduce stress.

The participants' recommendations regarding the AWS courses provided valuable insights into the course's perceived relevance and applicability. Most respondents who recommended the course did so based on its comprehensive coverage of cloud computing fundamentals, particularly for beginners or those seeking to enter cloud-related careers. For those interested in pursuing careers involving AWS or cloud computing, the course was seen as a critical stepping stone, offering essential knowledge that could enhance job opportunities in the field. This underscores the course's relevance in developing cloud computing skills, making it an asset for IT professionals looking to expand their expertise in this domain. On the other hand, some participants expressed reservations about recommending the course, particularly to individuals whose career paths do not directly involve AWS technologies. For these respondents, the course's specificity to AWS made it less useful outside of cloud-related roles, limiting its broader applicability. Additionally, a few participants noted that the course might not be suitable for those without a foundational understanding of technical concepts such as computer networks, operating systems, and servers. These responses suggest that while the course is valuable for individuals with relevant technical backgrounds or specific career goals in cloud computing, it may not be universally applicable.

The analysis of the first attempt scores from the AWS course shows varied performance among participants, with an average score of 74.62%, below the required 80% passing mark. The high standard deviation of 19.27% indicates a wide range of understanding, with some learners struggling while others excelled. A minimum score of 33% suggests that certain participants faced significant challenges, potentially due to gaps in prior knowledge. Meanwhile, the maximum score of 100% reflects strong preparation by some. The interquartile range (64.25% to 90.50%) shows that half of the participants scored within this range, but many did not pass, pointing to a need for personalized support and additional resources.

7. Limitations and Recommendation/Future Scope

The primary limitation of this study is its small sample size, consisting of only four participants. This limits the generalizability of the findings, as the results may not fully represent a broader population of AWS learners. To address this, future research should aim to include a larger and more diverse group of participants, exploring a wider range of AWS courses to capture a more comprehensive understanding of users learning experiences. The study also relies on self-reported data, which could introduce potential bias through over or under reporting of progress, confidence, and time spent on the platform. Future studies could mitigate this by utilizing platform-generated usage metrics for more objective data collection.

The research employed a mixed-method approach that combined both quantitative and qualitative data. While this provided valuable insights into the learning experience, the reliance on self-reported metrics could introduce subjectivity. The focus on a narrow range of AWS courses may limit the broader applicability of the findings. Incorporating longitudinal methods in future research could provide a more accurate assessment of AWS Skill Builder's long-term impact on learners, including tracking skill retention and career advancement over time. A broader comparative study of other cloud platforms like Microsoft Azure and Google Cloud would also yield useful insights into the effectiveness of various cloud-based learning systems.

Time constraints further restricted the depth of data collection and analysis in this study. The short-term nature of the research did not allow for long-term follow-up to assess how participants retained and applied their newly acquired skills in real-world settings. Future studies should allocate more time for data collection and consider incorporating follow-up studies to evaluate long-term learning outcomes. Additionally, while the self-assessment and reflection-based evaluation methods provided valuable insights, they could also introduce personal bias. Future research should explore the use of more advanced qualitative analysis software to improve the accuracy of thematic analysis and reduce subjectivity.

Technological limitations were another challenge, particularly concerning the complexity of AWS's user interface and the lack of support tools, such as discussion forums or Q&A, which may have hindered participants' learning experiences. To improve the platform, AWS could consider simplifying simulations and incorporating more interactive elements, such as support features, to enhance user engagement and facilitate a more effective learning process. The study's findings can be applied in both educational institutions and industry settings, guiding the design of more engaging and tailored cloud-based learning experiences that better prepare learners for careers in cloud computing.

Finally, the study was conducted with a small, context-specific group of university students, limiting the applicability of the findings to other populations or industries. To broaden the scope and relevance of future research, collaboration with other educational institutions or industry partners is recommended. Such collaborations could provide a more comprehensive view of how cloud-based learning platforms can be applied across different sectors, ensuring the study's findings have wider practical applications.

8. Implications of the study

The findings from this study hold several significant implications for educational institutions, cloud computing professionals, and the development of cloud-based learning platforms.

Enhancement of Learning Platforms: The notable variation in the time participants took to complete the AWS Skill Builder courses, compared to the estimated durations, underscores the need for more flexible and adaptive learning structures. Educational institutions and training providers should consider integrating adjustable pacing mechanisms into their platforms, allowing learners to proceed at their own speed without compromising content mastery. Additionally, the negative correlation between the usability of interactive elements and platform experience suggests that developers should prioritize intuitive design and provide clearer guidance for complex tools. This finding could extend to other cloud-based learning platforms, suggesting a broader need for more user-friendly interfaces that accommodate learners with varying levels of digital proficiency.

Curriculum Development: The marked improvement in participants' cloud computing knowledge, with most progressing from beginner to intermediate levels, reinforces the value of learning platforms like AWS. Educational programs should integrate cloud-based platforms into their curriculum to provide students with practical, industry-relevant skills. The study highlights that courses aligned with career aspirations are particularly effective, demonstrating that cloud computing skills are becoming critical for career advancement in IT and other technical fields. Additionally, long-term use of these platforms can further enhance workforce readiness, suggesting that educational institutions should consider building sustained learning pathways around cloud technologies.

Addressing Digital Skill Gaps: The positive correlation between course engagement and motivation to continue learning highlights the importance of designing courses that inspire both knowledge acquisition and ongoing learning. Institutions and organizations aiming to bridge the digital skill gap can leverage cloud-based platforms to foster a culture of continuous professional development. As some participants expressed lower confidence in applying their skills, institutions should also consider providing supplemental mentorship or targeted support to ensure learners are fully prepared to implement their new knowledge. This recommendation applies to both educational settings and corporate training programs, where bridging digital skill gaps is essential for keeping pace with technological advancements.

Workplace Training and Professional Development: The study demonstrates that cloud computing training has a direct impact on enhancing employees' skills, which is essential for modern digital workplaces. The fact that most participants found the skills acquired through AWS relevant to their careers suggests that organizations should invest in similar training programs to align employee development with technological advancements in cloud computing. This is particularly relevant in industries where cloud expertise is rapidly becoming a key competency. In the long term, organizations that adopt cloud-based training programs may find that these efforts contribute to improved employee retention and greater alignment with industry trends.

Improvement in Training Delivery: Participants faced challenges with the course content sequence and the user interface, indicating the need for course developers to refine the learning journey. Developers should ensure that simulations are placed after theoretical lessons to enhance comprehension and reduce confusion. Similarly, more intuitive user interfaces and clearer navigation options would improve the learning experience, reducing frustration and ensuring learners are better equipped to tackle complex topics. Additionally, more accurate time estimates for course completion could help learners manage their

schedules effectively, potentially improving completion rates and overall satisfaction. These improvements would not only benefit AWS Skill Builder but could also serve as valuable insights for other cloud-based learning platforms.

Generalizing Findings to Other Platforms: While this study focuses on AWS Skill Builder, its implications are applicable to other cloud-based learning systems. Educational institutions, developers, and training providers working with similar platforms should consider adopting flexible pacing mechanisms, user-friendly designs, and real-time support tools to enhance the learning experience. Furthermore, as cloud computing continues to grow in importance across industries, aligning these platforms with career development needs will be crucial for both students and professionals looking to stay competitive in the job market.

9. Conclusion

This pilot study explored the learning experiences of students engaging with AWS Skill Builder, providing both quantitative and qualitative insights into how the platform supports skill development, confidence, and job readiness. The findings suggest that AWS Skill Builder is an effective tool for enhancing cloud computing knowledge, as participants reported significant improvements in their understanding of cloud-related concepts. Notably, the discrepancy between the estimated and actual time required to complete courses highlights the need for more realistic time expectations, accounting for individual learning paces and course complexity.

The analysis of user experiences with the platform revealed that ease of navigation and well-organized content significantly enhanced the overall learning experience. However, challenges such as the complexity of interactive elements and an unintuitive user interface suggest areas for improvement. Addressing these issues could further optimize the platform's effectiveness, particularly for beginners.

Most participants found the AWS courses highly relevant to their career aspirations, indicating the platform’s potential to prepare learners for cloud-related roles. However, some participants faced difficulties applying their newfound skills with full confidence, suggesting a need for additional support or follow-up learning opportunities.

Furthermore, the findings from this study underscore the importance of collaboration between educational institutions and industries. By partnering with platforms like AWS, universities can better align their curricula with industry needs, ensuring that students develop the relevant technical skills required for modern workplaces. This industry-academia collaboration not only enhances students' employability but also helps bridge the gap between theoretical knowledge and practical application, preparing them for a seamless transition into the workforce.

In conclusion, AWS Skill Builder offers considerable value in technical skill development, but improvements to course structure, user interface, and support mechanisms could further enhance its impact. Future research should aim to include a larger participant sample, explore long-term career outcomes, and compare AWS Skill Builder with other cloud-based learning platforms to provide a more comprehensive view of its effectiveness.

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Appendices

Appendix 1
Reflection Journal Template
https://github.com/twt808/Learning_Experience_with_AWS_Appendices/blob/main/Reflection_Journal_Template.pdf

Appendix 2
Python Jupyter Notebook
https://github.com/twt808/Learning_Experience_with_AWS_Appendices/blob/main/Python_Jupyter_Notebook.pdf