INVESTIGATING THE IMPACT OF AWARENESS AND READINESS ON SECURITY CONCERNS IN CLOUD COMPUTING ADOPTION AMONG MALAYSIAN DIPLOMA OF INFORMATION TECHNOLOGY STUDENTS AT POLYTECHNIC SULTAN MIZAN ZAINAL ABIDIN

Norhayati Saa'dah Che Abd Razak [1], Nor Syahadataini Awang [2]

[12] Department of Information & Communication Technology, Polytechnic Sultan Mizan Zainal Abidin, 23000 Dungun, Terengganu

*Corresponding E-mail : norhayati.saadah@psmza.edu.my

ABSTRACT

Objective: This study investigates the relationship between students' awareness, readiness, and security concerns in the adoption of cloud computing technologies among Diploma in Information Technology students at Polytechnic Sultan Mizan Zainal Abidin. It aims to explore how students' levels of awareness and readiness influence their perceptions of privacy and data security when using cloud-based platforms in academic settings.

Research Method: A quantitative research method was applied using a structured questionnaire distributed to 254 students chosen through simple random sampling. The questionnaire measured three core construct awareness, readiness, and security concerns in relation to cloud computing. Data analysis was carried out using descriptive statistics and Pearson correlation with the aid of Microsoft Excel.

Findings: The results indicated high mean scores for awareness (M = 4.04, SD = 0.81), readiness (M = 4.00, SD = 0.81), and security concerns (M = 4.01, SD = 0.82). Correlation results demonstrated a moderate positive relationship between readiness and security concerns ($r = 0.577$, $p < 0.05$), as well as between awareness and security concerns ($r = 0.573$, $p < 0.05$). These findings suggest that students with higher awareness and readiness levels are more attentive to issues involving data protection and cybersecurity.

Originality: The findings of this study contribute to the limited research addressing how awareness, readiness, and security concerns interact in the context of cloud computing adoption among Malaysian diploma-level students in Information Technology. Drawing from a polytechnic environment, the study delivers new empirical perspectives on a segment of upcoming IT professionals that have received relatively little attention.

Keywords: awareness, readiness, security adoption, cloud computing

1. INTRODUCTION

In the era of digital transformation and the Fourth Industrial Revolution (IR4.0), cloud computing has emerged as a fundamental technology in modern education, particularly in the field of Information Technology (IT). Cloud computing enables flexible access to computing resources, software, and data via the internet without requiring significant investment in physical infrastructure. Its scalability, accessibility, and cost-effectiveness make it especially valuable for educational institutions seeking to enhance digital learning environments.

Cloud services provide numerous advantages, including remote accessibility, reduced operational costs, large-scale data storage, and enhanced online collaboration. Within academic settings, cloud computing supports e-learning platforms, digital content sharing, online assignment submission, and the use of development environments such as AWS Educate, Google Cloud, and Microsoft Azure for Students. In Malaysia, the Ministry of Higher Education (MOHE) actively promotes the

integration of cloud technologies through national initiatives such as the Malaysia Digital Economy Blueprint (MyDigital 2021–2030) and the Malaysia Education Blueprint (Higher Education) 2015–2025. These policies emphasize digital transformation in education and aim to produce graduates equipped with relevant technological competencies. At Polytechnic Sultan Mizan Zainal Abidin (PSMZA), cloud-based tools such as Google Workspace for Education and Microsoft 365 are widely implemented to facilitate teaching and learning among Diploma in Information Technology (DIT) students.

Despite the widespread adoption of cloud technologies, security-related concerns remain a significant challenge. Issues such as data breaches, unauthorized access, privacy violations, and compliance with the Personal Data Protection Act (PDPA) 2010 continue to generate uncertainty among users. Furthermore, students exhibit varying levels of trust in cloud service providers and differing degrees of awareness regarding appropriate cybersecurity practices. Although DIT students generally possess adequate digital literacy, not all fully understand the potential vulnerabilities associated with cloud-based systems. This raises concerns about whether technical competence alone is sufficient to ensure responsible and secure cloud usage.

Previous studies have highlighted similar issues. Raju, Abd Rahman, and Ahmad (2022) found that insufficient cybersecurity awareness among university students can lead to risky online behaviours. Rahim, Hassan, and Omar (2020) emphasized the role of awareness and readiness in shaping students' attitudes toward cloud technology adoption. Additionally, Paul et al. (2023) noted that although cloud computing significantly enhances teaching, learning, and research, its effective implementation in higher education remains constrained by gaps in user preparedness and security knowledge. However, most existing research has focused on university contexts, with limited empirical attention given to Malaysian polytechnics, where students' exposure to cloud technologies and cybersecurity training may differ.

At PSMZA, Diploma in Information Technology students frequently utilize cloud applications such as Google Workspace for Education, Microsoft 365, and AWS Educate for coursework and academic projects. Nevertheless, their levels of awareness, readiness, and understanding of cloud security risks have not been systematically examined. This gap in the literature underscores the need to investigate how awareness and readiness influence students' perceptions of security concerns in cloud computing adoption. By addressing this gap, the present study seeks to provide valuable insights that can support the development of targeted cybersecurity awareness programs, structured training modules, and institutional policies aimed at promoting safe, responsible, and effective cloud adoption in higher education settings.

2. LITERATURE REVIEW

In recent years, cloud computing has been widely integrated into the global education sector, aligning with the growing demand for flexible, technology-driven learning. It enables real-time collaboration, remote access to educational materials, and the use of advanced software tools without requiring local installation. However, the increasing reliance on cloud-based systems has also raised concerns about data security, reliability, and user preparedness. A study by Raju et al. (2022) investigated cybersecurity awareness among university students and revealed that although they possessed a basic understanding of security principles, many lacked practical knowledge about key concepts such as encryption, phishing, and multi-factor authentication. This highlights a gap between theoretical knowledge and real-world digital safety practices.

Similarly, Khalid and Zolkipli (2022) emphasized that one of the primary challenges of cloud security in higher education is the heavy reliance on third-party providers who manage sensitive institutional data. Issues such as data integrity, privacy breaches, and cross-border data storage regulations present critical risks that must be mitigated through institutional policies and targeted training programs. In

terms of readiness, Shah et al. (2022) examined technological preparedness among Malaysian higher education students and found that while they had sufficient access to the internet and devices, their level of security awareness and safe cloud practices remained inadequate. This finding is consistent with Abdul Rahim et al. (2023), who reported that Malaysian students' digital literacy often focuses on application usage rather than understanding cybersecurity and data protection principles.

Furthermore, Jafar et al. (2023) explored e-learning challenges during the COVID-19 pandemic, highlighting significant issues such as unstable internet connectivity, lack of proper devices, and limited cybersecurity practices. These findings underscore the need for comprehensive digital safety education, particularly in institutions that rely heavily on cloud-based platforms for online learning. The Borneo International Journal (2022) conducted a cross-sector comparative study and found that the main barriers to cloud adoption include lack of user trust, vendor lock-in, and users' inability to assess the reliability and security posture of cloud service providers.

On a global scale, a report indicated that the education sector ranks among the top five industries using cloud services but also records one of the highest rates of security incidents, often due to configuration errors and unsafe user behavior. This finding reinforces the idea that human awareness and preparedness are as crucial as technical safeguards in maintaining cloud security.

Therefore, there is a growing need to explore the level of awareness, readiness, and security concerns among Diploma level IT students in Malaysian polytechnics. Such research can contribute valuable insights to institutional security policies, curriculum development, and capacity-building efforts ensuring that future IT professionals are not only technologically proficient but also security-conscious in managing cloud-based systems.

3. METHODOLOGY

This chapter outlines the research design, target population and sampling method, research instrument, data collection process, and data analysis techniques applied in this study. Its objective is to explain the systematic steps taken to examine the relationship between students' readiness and their safety concerns regarding the adoption of cloud computing.

3.1 RESEARCH DESIGN

This study adopted quantitative research design using a survey approach to collect data from students. The design was chosen to enable statistical analysis of relationships between students' readiness and their safety concerns regarding the adoption of cloud computing. A structured questionnaire was used as the main instrument to gather measurable data from respondents. The quantitative design also allowed for objective comparison and generalization of findings within the study population.

3.2 POPULATION AND SAMPLING

The target population for this research consisted of 580 Diploma in Information Technology (DIT) students at Polytechnic Sultan Mizan Zainal Abidin (PSMZA). Based on Krejcie and Morgan's (1970) sampling table, a sample of 254 students was deemed sufficient to represent the population. The respondents were selected using a simple random sampling technique to ensure fairness and equal representation across different semesters. This approach minimized sampling bias and increased the reliability of the results.

3.3 RESEARCH INSTRUMENT

The primary method of gathering data involved a structured questionnaire that was divided into four main sections, as shown in Table 1 below.

Table 1: Data collection instrument

Section	Item	Items' focus	Cronbach's alpha values
A	Demographic	Respondents' demographic information (e.g., gender, semester, frequency of cloud use).	Not related
B	Awareness	Focusing on students' understanding and knowledge of cloud computing concepts and services.	0.973
C	Readiness	Focusing on students' skills, confidence, and willingness to use cloud computing services.	0.932
D	Safety concerns	Focusing on issues related to data privacy, security, and protection.	0.949

The data for this study were collected online through Google Forms. Before responding, participants were briefed on the purpose of the research and assured that their participation was voluntary, anonymous, and strictly confidential. The survey link was shared via class representatives and official academic communication channels. Data collection was conducted over a two-week period, and any incomplete responses were removed prior to analysis.

The reliability of the instrument was assessed using Cronbach's Alpha to determine the internal consistency of each construct. The coefficients obtained for the constructs Awareness ($\alpha = 0.973$), Readiness ($\alpha = 0.932$), and Safety Concerns ($\alpha = 0.949$) indicate a very high level of reliability ($\alpha > 0.90$). This demonstrates that all items in the research instrument are consistent and suitable for actual data collection.

3.4 DATA COLLECTION AND ANALYSIS

The collected data were processed and analysed using Microsoft Excel. The analysis was conducted in two main stages. First, descriptive statistics, including mean, frequency, and percentage, were computed to summarize students' levels of awareness, readiness, and security concerns regarding cloud computing adoption. These measures provided an overview of the general response patterns and the overall tendency of each construct.

Second, inferential statistical analysis was performed using the Pearson correlation coefficient to examine the relationships between awareness, readiness, and security concerns in the adoption of cloud computing. The strength and direction of the relationships were interpreted based on the correlation coefficient values, while statistical significance was determined at the $p < 0.05$ level. This approach enabled the study to identify whether meaningful associations existed among the key variables.

4. RESULTS AND DISCUSSIONS

The results of the questionnaire analysis conducted are discussed as follows.

4.1 Result

This section presents the findings from the descriptive and inferential statistical analyses conducted to examine students' awareness, readiness, and safety concerns in adopting cloud computing technologies. Table 2 presents the mean and standard deviation for the three main constructs: Awareness, Readiness, and Safety Concerns among Diploma in Information Technology students at Polytechnic Sultan Mizan Zainal Abidin.

Table 2: Analysis Result

Item	Mean	Standard Deviation (SD)	Interpretation
Awareness	4.04	0.81	High
Readiness	4.00	0.81	High
Safety concerns	4.01	0.82	High

The results indicate that students demonstrated high levels across all three constructs. Awareness recorded the highest mean (M = 4.04, SD = 0.81), suggesting that students are well-informed about cloud computing concepts, benefits, and academic applications. Readiness also scored high (M = 4.00, SD = 0.81), indicating that students possess the necessary skills, confidence, and willingness to utilize cloud-based platforms effectively. Similarly, Safety Concerns (M = 4.01, SD = 0.82) reflect students' strong sensitivity toward data privacy and cybersecurity risks when using cloud services. The nearly identical standard deviation values (0.81–0.82) suggest moderate variability among respondents, indicating relatively consistent perceptions across the student population.

To determine the relationships among the constructs, Pearson correlation analysis was conducted. The results are presented in Table 3.

Table 3: Pearson Correlation Analysis Between Constructs

Variables	Awareness	Readiness	Safety Concerns
Awareness	1	—	0.573*
Readiness	—	1	0.577*
Safety Concerns	0.573*	0.577*	1

*Note: $p < 0.05$

The findings reveal two significant moderate positive relationships. First, there is a moderate positive correlation between Readiness and Safety Concerns ($r = 0.577$, $p < 0.05$), indicating that students who are more technologically prepared are also more attentive to potential security and privacy risks. Second, Awareness is moderately positively correlated with Safety Concerns ($r = 0.573$, $p < 0.05$), suggesting that students with greater knowledge of cloud computing concepts tend to demonstrate stronger concern regarding data protection and cybersecurity issues.

Although the direct correlation value between Awareness and Readiness is not presented in Table 3, the descriptive findings in Table 2 show that both constructs share very similar mean scores (Awareness M = 4.04; Readiness M = 4.00). This similarity suggests a conceptual linkage between the two variables. Students who possess higher awareness of cloud computing concepts are likely to feel more confident and prepared to use cloud-based technologies. Awareness provides the foundational knowledge, while readiness reflects the practical capability and willingness to apply that knowledge. Therefore, it can be reasonably inferred that awareness and readiness develop concurrently, reinforcing students' overall digital competence in cloud computing adoption.

Overall, the correlation results indicate that awareness, readiness, and safety concerns are interconnected constructs. As students become more knowledgeable and technologically prepared, their sensitivity toward cybersecurity practices and responsible digital behaviour also increases.

4.2 DISCUSSION

The findings indicate that Diploma in Information Technology students at Polytechnic Sultan Mizan Zainal Abidin demonstrate a high level of awareness of cloud computing (M = 4.04, SD = 0.81). This suggests that students possess substantial knowledge of cloud computing concepts, benefits, and applications, including file

sharing, online collaboration, and remote data storage. This result is consistent with Jayeola et al. (2022) and Zulkifli and Abas (2022), who emphasized that greater awareness enhances users' willingness to adopt emerging digital technologies.

Students also reported a high level of readiness (M = 4.00, SD = 0.81), indicating that they feel confident and capable of effectively using cloud-based platforms in their academic activities. This finding supports Abdalla (2024) and Abu Bakar et al. (2025), who identified readiness as a critical factor influencing successful digital technology implementation. The high readiness level reflects students' technical competence, familiarity with cloud tools, and positive attitudes toward integrating such technologies into their learning environment.

At the same time, the study revealed a high level of safety concerns (M = 4.01, SD = 0.82). This demonstrates that although students are open to adopting cloud computing, they remain cautious about issues such as data privacy, unauthorized access, and cybersecurity threats. These findings align with Nagahawatta et al. (2024) and Kolli (2025), who reported that security and privacy concerns continue to be major considerations in cloud adoption across various sectors.

The correlation analysis further strengthens these findings by demonstrating significant moderate positive relationships between the constructs. First, a moderate positive correlation was found between readiness and security concerns ($r = 0.577$, $p < 0.05$), indicating that students who are more technologically prepared are also more attentive to potential security risks. Second, a moderate positive correlation was observed between awareness and safety concerns ($r = 0.573$, $p < 0.05$), suggesting that students with greater understanding of cloud computing concepts are more conscious of data protection and privacy issues.

Importantly, these findings suggest that increased technological competence does not reduce concern about security risks; rather, it enhances risk awareness. Students who are knowledgeable and ready to use cloud technologies appear to be more security-conscious and responsible users. This indicates that awareness, readiness, and cybersecurity understanding develop concurrently and reinforce one another, rather than functioning as independent constructs. Such a pattern supports Jayeola et al. (2022), who observed that higher technological engagement often leads to stronger sensitivity toward digital security practices.

Overall, the results demonstrate that students at PSMZA are not only technically competent but also security-aware in adopting cloud computing technologies. This balanced profile of competence and caution is essential in preparing future IT professionals who will manage cloud-based systems in academic and professional contexts. Therefore, institutions should continue strengthening cybersecurity education through structured training, workshops, and curriculum integration to further enhance responsible cloud usage.

However, this study is limited to Diploma in Information Technology students at a single polytechnic institution, which may restrict the generalizability of the findings. Future research could expand the scope to include multiple institutions or compare different academic disciplines. Additionally, examining other influencing factors such as digital literacy level, prior cybersecurity training, or frequency of cloud usage may provide a more comprehensive understanding of cloud computing adoption behavior.

5. CONCLUSIONS

This study examined students' awareness, readiness, and security concerns in adopting cloud computing at Polytechnic Sultan Mizan Zainal Abidin. The findings revealed that students exhibited high levels of awareness (M = 4.04), readiness (M = 4.00), and security concern (M = 4.01), indicating strong engagement with cloud technologies in their academic environment. The correlation analysis demonstrated two significant relationships. A moderate positive correlation between readiness and security concerns ($r = 0.577$, $p < 0.05$) suggests that students who are more technologically capable are also more attentive to data privacy and cybersecurity

issues. Similarly, a moderate positive correlation between awareness and security concerns ($r = 0.573$, $p < 0.05$) indicates that students with greater understanding of cloud concepts are more likely to be cautious about data protection and safe digital practices. These findings highlight that awareness, readiness, and security consciousness develop concurrently, reflecting the interconnected nature of digital competence and cyber awareness.

The results emphasize the need for higher education institutions to balance digital readiness with cybersecurity education. Strengthening both elements can enhance students' technical competence while ensuring responsible and secure technology adoption in academic settings. From a practical perspective, institutions should integrate structured training programs on cloud computing and cybersecurity awareness into the curriculum. Workshops, seminars, and project-based learning can further develop students' digital confidence while reinforcing safe online behaviors. Embedding cloud literacy and digital ethics within academic programs will help cultivate a generation of learners who are both technologically skilled and security-conscious supporting Malaysia's vision for a digitally resilient and secure education ecosystem.

This study contributes to both academic research and educational policy by focusing on Diploma-level Information Technology students, a group often overlooked despite being future IT professionals expected to work extensively with cloud-based technologies. The findings provide valuable insights into how digital competence and security awareness intersect, offering a foundation for future initiatives aimed at enhancing safe and effective cloud adoption in higher education.

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