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Cloud Computing Adoption and Academic Performance in Higher Education: An Extended Technology Acceptance Model Approach

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ABSTRACT

While cloud computing has become more widespread in higher education, research examining its adoption through integrated theoretical models remains limited, especially in developed, small-market settings like New Zealand (NZ). Existing studies often rely on core Technology Acceptance Model (TAM) constructs and mainly focus on adoption intentions, with little attention to cloud-specific features and academic performance outcomes. To address these gaps, this study develops and tests an extended TAM model that includes key cloud computing characteristics such as security, cost efficiency, scalability, and accessibility, and explores their relationship with students' academic performance. Using survey data from tertiary students in New Zealand, the model is empirically tested with quantitative analysis methods. The findings show that perceived usefulness and ease of use significantly influence cloud computing adoption, and cloud-specific features further reinforce adoption behaviour. Importantly, the results also reveal a positive link between cloud computing adoption and students' academic performance. This study advances theory by extending TAM to include context-specific technological attributes and outcome variables, and offers practical insights for higher education institutions aiming to improve learning results through effective cloud technology deployment. Ultimately, by enhancing the integration and efficiency of cloud technology in academic settings, educational institutions and technology providers can better meet the needs and preferences of students and instructors by understanding and addressing these concerns.

Keywords: Cloud Computing; Technology Adoption; Academic Learning

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1. Introduction

Everyone assumes that those born after 1980 are inherently tech-savvy because they grew up with access to computers and the Internet. This group of individuals, also known as the "Net Generation," "Millennials," or "Digital Natives", is assumed to have profound knowledge of digital technologies [1]. This is not necessarily true, as even those who are tech savvy struggle to keep pace with the rapid pace of technological advancements.

Cloud Computing (CC) or Cloud Technology (CT) has become widely adopted in the Information and Communication Technology (ICT) sector. Cloud computing is a highly adaptable technology that utilises virtual resources shared among users. Modern CT service providers such as Google, Microsoft, Amazon, IBM, and many others offer free online services and tools to students and staff at tertiary institutions, including file sharing, email, calendars, contact lists, document storage, software, learning management systems (LMS), productivity tools, website development tools, presentations, and meeting spaces [2].

Cloud computing utilises software and hardware to deliver services to users via a network, typically the internet. Its architecture enables a centralised repository of adaptable computing resources such as storage, networks, services, apps, and servers that can be swiftly established and distributed with minimal oversight or vendor involvement. The cloud architecture includes five key characteristics, three service types, and four deployment models [3].

Cloud-based technology offers many benefits: lower costs, pay-as-you-go, fast deployment, rapid elasticity, scalability, ubiquitous network access, rapid provisioning, greater resiliency, cybersecurity, real-time monitoring, on-demand services, and immediate service restoration. Therefore, switching to cloud-based technology services makes users more productive and allows them to collaborate more efficiently [4].

Students who adopt cloud computing can access files and run programmes from any Internet-connected device [3]. Additionally, CC provides a unified framework for delivering services to students that are pull-based and available on demand at any time and from any location worldwide.

Although the adoption of cloud computing in higher education has been extensively studied, several gaps still exist. Previous research has mainly concentrated on general adoption factors or on contexts within developing countries, with limited empirical evidence from developed, small-market settings such as New Zealand (NZ). Additionally, many studies depend on core Technology Acceptance Model (TAM) constructs without adequately including cloud-specific features, such as security, cost efficiency, scalability, and on-demand accessibility. Significantly, technology acceptance is often analysed in isolation, with little focus on its relationship with students' academic performance. This study addresses these gaps by proposing and testing an integrated TAM-based model that connects cloud characteristics, technology acceptance, and academic performance among New Zealand tertiary students.

1.1. Research Objectives

The primary research aim is to examine the acceptance and adoption of cloud technology among tertiary students in New Zealand within their academic pursuits. The other aims are to evaluate the characteristics of cloud technologies that influence tertiary students' use of these tools and to assess the impact on academic performance through the use of cloud-based applications.

1.2. Research Questions

This study primarily focuses on the following research questions:

RQ1: How do students in New Zealand's tertiary education perceive, accept, and adopt cloud technology?

RQ2: Which features of cloud technology affect students' decision-making when incorporating cloud services into their academic experiences?

2. Literature Review

Cloud computing is a critical enabler of organisational digital transformation, offering scalable infrastructure, cost optimisation, and enhanced service delivery across sectors [5]. Recent research has focused on the evolution of service models (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS)), hybrid and multi-cloud strategies, and resource management to support performance and resilience [6]. Simultaneously, security and privacy concerns remain central to cloud adoption, with ongoing efforts examining frameworks and best practices to mitigate risk while preserving flexibility [7, 8].

Cloud computing transforms the way modern business IT infrastructure is built and managed by providing solutions such as applications, platforms, and infrastructure. This technology enables quick and simple access to highly flexible groups of computing resources. These resources are accessible via an internet connection as a service to anyone, anywhere in the world. By using cloud services, educational institutions can more efficiently meet the needs of their students and offer services while saving money on developing IT infrastructure without needing to invest in hardware, software, equipment, or student training. Additionally, many cloud computing services, including Dropbox, I-Cloud, SkyDrive, G-Drive, Google Apps (Gmail, Google Docs, and Microsoft Cloud Service), and I-Cloud, are easily integrated into educational environments [9].

Recent research on cloud computing adoption in higher education increasingly applies technology acceptance and related models to explain user behaviour and educational outcomes. Empirical evidence indicates that adopting cloud services can positively influence academic performance and institutional innovation, with perceived usefulness and ease of use remaining key determinants in student acceptance [10]. Studies also show that specific contextual factors—such as security, privacy, and external disruptions like the COVID-19 pandemic—significantly shape adoption processes and their effects on learning outcomes (e.g., effects before vs during the pandemic on adoption and performance) among university students Moreover, recent integrative models demonstrate enhanced explanatory power regarding behavioural intentions towards cloud adoption in educational settings, emphasising the role of social influence and facilitating conditions [11].

2.1. Technology Acceptance Model (TAM)

User acceptability is crucial for effectively operating any information system or policy implementation. The Technology Acceptance Model (TAM) is a recognised and well-established framework for examining how users accept and utilise technology [12]. TAM is a reputable theoretical model for explaining IT use and acceptance processes. It accounts for a significant portion of the variation in users' behavioural intentions regarding IT use and acceptance across different circumstances [13]. It encompasses attitudes, beliefs, intentions, and actions that describe an individual's behaviours towards IT acceptance [14]. Perceived usefulness refers to a potential user's perceived likelihood that using an application will enhance their effectiveness within an organisational context. The degree to which a prospective user perceives the application as effort-free is termed perceived ease of use [14]. Recent empirical studies continue to validate TAM's core constructs, showing that perceived usefulness and perceived ease of use significantly influence behavioural intentions to adopt technologies in contemporary contexts such as AI-powered training systems [15, 16].

Mobile cloud computing is considered one of the most significant innovations in the field of computer science. It is also an emerging concept that integrates mobile technology with cloud technologies through mobile devices. Based on the Technology Acceptance Model (TAM), a model was developed to examine the key factors influencing user acceptance of cloud services. The findings indicate that connectivity, satisfaction, security, and perceived mobility strongly influence students' acceptance and adoption of cloud services. Moreover, perceived usefulness is defined as the extent to which a university believes that implementing mobile cloud technologies enhances students' academic achievement [17].

Based upon the above factors, the following hypotheses are formulated for this study:

H1. *The perceived ease of use (PEU) of cloud-based technologies positively influences students' academic performance.*

H2. *Perceived usefulness (PU) of cloud-based technologies positively influences students' academic performance.*

2.2. Student Acceptance of Cloud-Based Technology

Cloud computing is becoming essential to tertiary education due to its widespread adoption and innovative applications for meeting academic needs. Cloud computing offers great potential for providing students with access to high-quality educational resources more flexibly and at a reasonable cost [9].

2.2.1. Usefulness and Ease of Use of Cloud Technology

Cloud technology assists users with less IT expertise in using it and enables clients to access support from any location using any suitable terminal [18]. Low-cost or free, more accessible access to ICT systems and increased privacy of information for agile programming are all advantages of cloud computing acceptance [19, 20]. Moreover, cloud computing offers greater efficiency and effectiveness when retrieving data regardless of where they are [21].

Perceived ease of use can be described as a student's belief that using cloud services requires no effort [22]. It is one of the key elements of the TAM model and plays a significant role in the adoption of new technologies such as cloud computing and mobile learning [17]. The complexity of cloud applications mainly hinges on how simple it is to perform essential tasks like transferring files, retrieving saved files, and saving files. The quicker and more straightforward these activities are, the lower the perceived difficulty and the faster and clearer the perceived benefits of cloud technologies become. The acceptance and adoption of cloud technologies have also recently gained momentum.

Based upon the above discussion, the following hypotheses are formulated for this study:

H3. *Perceived ease of use (PEU) positively influences students' acceptance of cloud-based technologies.*

H4. *Perceived usefulness (PU) positively influences students' acceptance of cloud-based technologies.*

2.2.2. Cost

Cloud computing presents numerous risks and challenges, including security, performance, and additional costs [13]. Initially, cloud technologies may appear considerably cheaper than implementing and maintaining an internal software solution [23]. Simultaneously, service providers often offer very affordable or even free services [3]. Pay-per-use fees are usually charged for cloud-based applications. Although facilities can be activated as needed, they might unintentionally remain on when not in use. Providers apply various criteria to calculate usage fees. BigQuery costs depend on the number of data rows queried; Google Cloud Storage charges are based on size, access tier, and region; Google Compute Engines fees depend on availability (preemptible), Central Processing Unit (CPU), long-term storage needs, operating system, and uptime. Certain services also impose fees based on the number of Application Programming Interface (API) calls, licensed users, or proportional system charges [24].

But if students do not keep an eye on things, unnecessary consumption-based expenses can build up. According to Gartner, although many cloud computing providers portray themselves as utility-based and only charge for the services their clients use, most contracts require businesses to commit to an ongoing agreement regardless of how much cloud usage actually occurs. Students must carefully review the information and prices for every application [23].

However, users may unintentionally register or allocate themselves to services that are rarely or never used facilities. These elements negatively impact service providers and decrease student satisfaction. Moreover, students' acceptance of cloud technology is eventually affected by some hidden charges from vendors. Typically, service providers bill by the hour, and cloud technologies are charged based on the time students utilise them. Therefore, although initial costs are low, ongoing operational costs can be higher than those of on-premises solutions.

Additionally, there may be extra charges for vendor lock-in, analytics, managed services, data access and transfer fees, and analytics. The complex pricing structure might sometimes hinder cloud adoption as well.

H5. *Additional Cost (AC) negatively affects students' acceptance of cloud-based technologies.*

2.2.3. Security

The term "security" describes how much students believe cloud services are safe places to store and exchange private information. Because transferring confidential data over the cloud is perceived as risky when using cloud-based services [25]. On the contrary, cloud computing is built on technological advances, and the security flaws in current technology will be automatically passed on to a cloud computing platform, posing even bigger security dangers. From information security, network security, and cloud computing security, the consistent necessity is for safety in data privacy and security safeguarding [26]. The safety of wireless data transfer and cloud-based applications is a significant factor that can influence the adoption of cloud services [25]. Data security, access control and identity authentication, virtualisation security, and service availability are just a few of the risks to privacy security that may be identified based on the findings of relevant scholarly research and the annual report of the Cloud Security Alliance (CSA)[26].

Furthermore, cloud data can be large, unstructured, or semi-structured, and students depend on the service provider to ensure comprehensive information security. Therefore, the service provider must meet objectives such as maintaining the privacy and security of data, which are essential for secure access and sharing[18, 27]. However, as cloud security has advanced, standard security practices—such as encryption, utilisation of the latest security applications, cyber insurance coverage, and security audits—have been incorporated[28]. More importantly, cloud security generally matches or surpasses outdated or in-house systems, as providers can allocate resources towards addressing security challenges that most users can manage[18].

The level at which students perceive cloud storage services as secure places for storing and exchanging personal information is also known as perceived security. Vendors should ensure that their primary security objectives are integrity, confidentiality, and availability. Integrity safeguards private information against unauthorized modification, deletion, or falsification. The term "availability" refers to the accessibility and ease of use of services and information upon request by an authorised party[22, 29]. Students' perceptions of cloud-based services as safe venues for storing and sharing confidential information will be assessed in terms of security. There is a perceived risk in communicating important data when using cloud technologies. Students' attitudes towards such services may change if they believe security is lacking. Based on the above discussion, the following hypothesis is formulated:

H6. *Perceived security (PS) positively influences students' acceptance of cloud-based technologies.*

2.2.4. On-Demand Service

On-demand service is one of the five key characteristics that define cloud technologies[30]. More importantly, the European Network and Information Security Agency (ENISA) describes cloud computing as an "on-demand service model for IT provision, often based on virtualisation and distributed computing technologies[31]. On-demand service can be distributed automatically according to customer requests without human intervention[3]. Additionally, on-demand self-service enables the customer to access and utilise resources whenever required, without needing assistance from the cloud provider[31, 32]. Unlike services that may require administrative assistance, it avoids delays or miscommunication risks.

Students can instantly boost their resources in real-time through a cloud-based system, allowing them to quickly meet their needs. Conversely, students must be able to swiftly scale their computing resources up or down according to requirements, whether temporarily or permanently, to adapt to changing demands. More importantly, since vendors managing the on-demand services oversee resources such as servers and hardware, system upgrades and maintenance, students do not need to purchase, maintain, or upgrade software or hardware.

Thus, the following hypothesis is formulated.

H7. *On-demand service would positively influence students' acceptance of cloud-based technologies.*

2.2.5. Scalability

Scalability is the service provider's ability to deliver services at higher capacity by increasing the service volume[33]. Cloud scalability refers to a cloud-based computing system's capacity to adapt to changing demand by expanding or reducing its resources on request, such as storage, processing power, and internet bandwidth. It allows the IT infrastructure to modify its resources to meet performance standards[33]. Consequently, students have virtually unlimited capacity for storage and scalability. They can add or remove services as needed[34]. Furthermore, depending on students' needs, computer resources can be allocated and distributed quickly and efficiently[3].

With the use of cloud computing, students can purchase IT resources as needed for a project, depending on what is required at any given time. It is no longer economically feasible to invest capital in computer facilities to meet short-term needs for greater capacity infrastructure. It is possible that unforeseen demand won't allow sufficient time to set up and purchase infrastructure[28]. Thus, the scalability of cloud technology enables students to adapt to different situations.

Considering these, the following hypothesis is formulated:

H8. *Scalability positively influences students' acceptance of cloud-based technologies.*

2.2.6. Storage and Backup

With the rapid growth of internet technologies, large-scale online services, such as data backup and recovery, are becoming increasingly available [35]. Cloud storage is a storage facility where electronic information is kept securely. It is a service used to manage, back up, and preserve information externally, making it accessible to students through the internet [25]. On the other hand, since all the data is stored in the cloud, backing it up and restoring it is comparatively simpler than storing it locally [23].

One of the main advantages of cloud-based technology is the backup facility [36]. Cloud computing offers significant benefits for data backup, storage space, and access at a reasonable price [35]. Service providers provide students with platforms and convenience for storing their essential data. In a disaster, the service provider makes it easy to restore what they have lost at any point [34]. Having access to nearly unlimited storage eliminates a zero-sum competition for disk space [23]. Cloud-based storage can utilise multiple locations to deliver "5-9s" (99.999%) availability, a level of performance that could be prohibitively expensive for students. Therefore, multiregional architectures enable automatic backups) [24].

This solution offers an alternative path for tertiary students to keep their data. If one database crashes, the cloud facility can recover information from another. Additionally, users can access the information from anywhere because it is stored in a single location [28].

Considering the above factors, the following hypothesis is formulated:

H9. *Backup and disaster recovery features positively influence students' acceptance of cloud-based technologies.*

2.2.7. Mobility

Mobility provides cloud-based technologies with "on-the-go" capability and enables access from anywhere in the world via an online connection to any device. It makes cloud computing accessible globally, allowing students to use their apps at any time [3, 34].

Improving communication and sharing of information are two of cloud mobility's greatest benefits. The cloud enables anyone to access vital information and applications from anywhere at any time. One commonly cited advantage of cloud-based technologies is the flexibility to use your own device (BYOD). The cloud turns all your internet-connected devices into potential devices.

The following hypothesis is hence formulated:

H10. *Mobility has a positive influence on students' acceptance of cloud-based technologies.*

3. Conceptual Framework

Based on the literature review that employs the Technology Acceptance Model (TAM) and other parameters to examine the factors influencing students' acceptance and adoption of cloud technology, ten hypotheses were formulated.

Based on these ten hypotheses, the above conceptual framework (**Figure 1**) was developed to assess the relationships between these variables and students' acceptance and adoption of cloud technology.

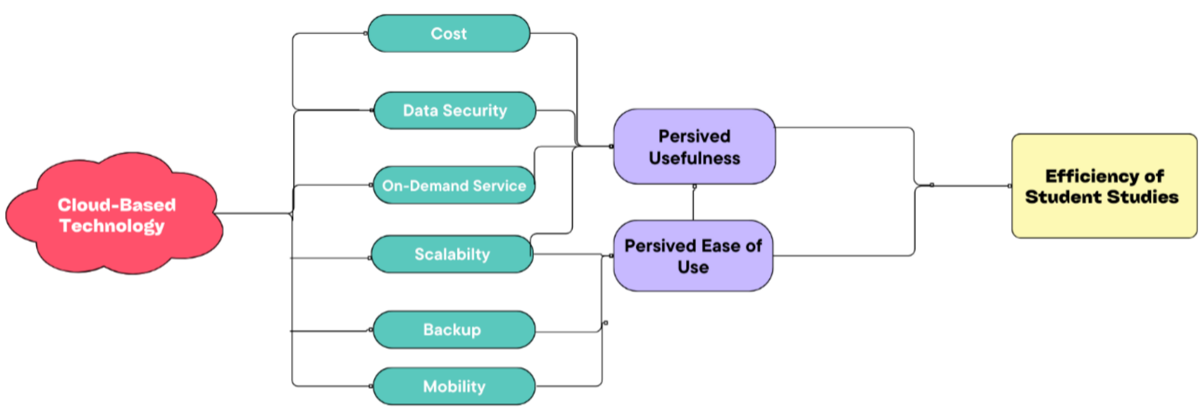

Figure 1. Conceptual Framework.

4. Research Methodology

4.1. Research Strategy

This research study predominantly employs quantitative methods, primarily involving survey techniques. In quantitative research, a survey technique is implemented through questionnaires, planned interviews, or, in certain cases, structured observations. The study utilises both open-ended and closed-ended questionnaires to collect data.

4.1.1. Sampling Technique

In this research study, a non-probability sampling technique using convenience sampling, also known as availability sampling, was employed, whereby respondents were easily selected from among tertiary students in Auckland.

4.1.2. Sample Size

Considering NZ's tertiary education student population is 377,695 (Ministry of Education, n.d.), the sample size should be 384 (**Figure 2**).

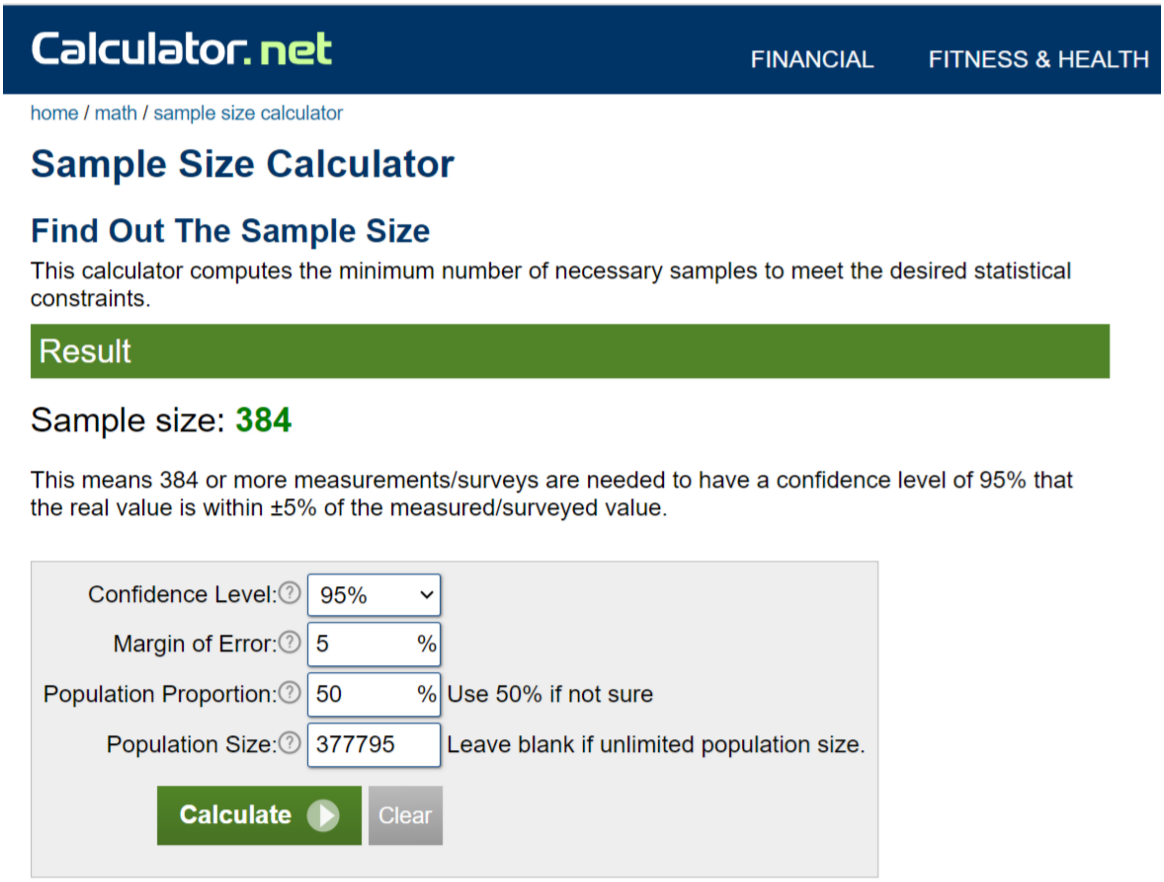

Figure 2. Sample Size.

4.2. Reliability and Validity Analysis

Reliability was assessed using Cronbach's Alpha and Composite Reliability (CR). Values above $0.70 are generally considered acceptable, while values above $0.80 are considered good to excellent (**Table 1**).

Result: All constructs demonstrate excellent reliability, with values well above the $0.70 threshold.

Validity was assessed through Convergent Validity (using AVE) and Discriminant Validity (using the Fornell-Larcker criterion).

4.3. Convergent Validity

Convergent validity is confirmed if the Average Variance Extracted (AVE) is greater than $0.50, indicating that the construct explains more than half of the variance of its indicators (**Table 2**).

Table 1. Reliability Analysis.

Construct	Items	Cronbach's Alpha	Composite Reliability (CR)
Perceived Usefulness (PU)	11, 12, 13, 14, 15, 16	$0.9554	$0.9558
Perceived Ease of Use (PEOU)	17, 18, 19, 20, 21	$0.9275	$0.9284
Decision Influencing Factors (DIF)	22, 24, 25, 26, 27	$0.8907	$0.8927

Table 2. Convergent Validity Analysis.

Construct	AVE	Status
Perceived Usefulness (PU)	$0.7830	Supported (>0.50)
Perceived Ease of Use (PEOU)	$0.7223	Supported (>0.50)
Decision Influencing Factors (DIF)	$0.6252	Supported (>0.50)

4.4. Discriminant Validity (Fornell-Larcker Criterion)

Discriminant validity is confirmed if the square root of the AVE for each construct is higher than its correlations with other constructs (**Table 3**).

Result: In all cases, the square root of the AVE is higher than the correlations with other constructs, confirming that the constructs are statistically distinct.

4.5. Summary of Results

- **Internal Consistency:** The survey instruments are highly reliable (Alpha > $0.89).
- **Convergent Validity:** All factors represent their respective constructs well (AVE > 0.62).
- **Discriminant Validity:** The constructs are clearly differentiated from one another.

4.6. Data Analysis

Analytical software such as SPSS and Microsoft Excel were used to carry out quantitative data analysis. The research survey questionnaire was designed with a five-point Likert-type scale, with one for "strongly disagree" and five for "strongly agree"[37]. It includes open-ended and close-ended questionnaires categorised into demographic data and respondents' attitudes, experiences, or opinions. It was developed using Google Forms and distributed via e-mail, messenger, and WhatsApp. Alternatively, a QR code was created for easy access to the questionnaire.

Table 3. Discriminant Validity Analysis.

Construct	PU	PEOU	DIF
PU	0.8849		
PEOU	$0.7697	0.8499	
DIF	$0.6985	$0.7288	0.7907

Note: Diagonal values (in bold) represent the square root of AVE. Off-diagonal values are inter-construct correlations.

5. Findings and Discussion

These research data indicate that cloud technology is widely used across various disciplines and highlight its advantages, such as on-demand service, scalability, accessibility, automatic updates and maintenance, data security, disaster recovery, mobility, collaboration, and cost-effectiveness. Cloud-based applications and software provide NZ tertiary students with several benefits over traditional hardware and software installed on-premises. These benefits make them an attractive option for individuals and students aiming to leverage the power of cloud technology for their study needs.

Furthermore, these results highlight how extensively cloud computing is utilised by students in their studies, such as in group communications, web hosting, software access, storage, and communication, demonstrating its flexibility and importance in modern digital workflows. These findings show that respondents widely recognise cloud computing as having a significant and positive impact on enhancing their studies, reflecting a shared understanding of its advantages. Importantly, the results indicate that cloud-based technologies generally have a beneficial effect on students, emphasising that they can improve learning experiences by enabling resource access, fostering collaboration, and supporting flexible educational environments.

5.1. Data Analysis

5.1.1. Descriptive Analysis

According to **Table 4**, it is clear that the age group of 26 to 40 years old accounts for the majority of respondents, making up about 66.1% of all survey respondents. Furthermore, the gender distribution of the respondents is generally balanced, with females comprising 50% and males accounting for 47.8% of the total number of respondents.

Figure 3 illustrates the use of cloud services by respondents in tertiary education in New Zealand. According to the survey on tertiary students' use of cloud technology, 81.1% confirmed using it, while 12.9% admitted not using it. Additionally, a certain percentage of respondents said they were unsure whether they were using cloud technology.

Figure 4 shows the use of cloud-based technologies and applications among respondents, who utilise facilities for various purposes. File storage (Google Drive, Apple Cloud, OneDrive) is the most popular, at 79%, followed by application (Software, Microsoft Office 365, Googlesheet.doc, Canva, Mendeley, Grammarly) and software use at 72%. Another common feature used by 64.3% of respondents is instant messaging (WhatsApp, Instagram, Messenger) over cloud platforms. Additionally, 15% of respondents mentioned hosting websites on cloud services. Only 1% said they used cloud services for other, unspecified purposes.

Figure 5 illustrates the frequency of cloud-based technologies used by respondents. However, students utilise cloud-based applications for collaborative projects or assignments at varying paces. 45% stated they used them daily, indicating a high frequency of use, while 36% used them weekly. Conversely, 2% of respondents said they have never used cloud-based applications for group projects or assignments.

The survey findings in **Table 5** reveal varying perspectives on the perceived impact of cloud technology on academic performance. An equal percentage of respondents, amounting to 34.4% (77 students), either extremely likely or likely, indicated that CBT would enhance their academic results. Additionally, 23.2% (52 students) held a neutral stance on this issue, while 8% of respondents believed it was unlikely that adopting cloud technology would improve their academic performance. Therefore, this study concludes that NZ tertiary students generally believe that employing cloud-based technologies can boost their academic success.

Table 4. Gender and Age Distribution.

		Age Range				Total
		16–25	**26–40**	**41–50**	**Above 50**	
Gender	Did not mention	0	0	1	0	1
	Female	12	78	17	2	109
	LGBTQ	0	1	0	0	1
	Male	16	70	17	7	110
	Prefer not to say	1	0	2	0	3
Total		29	149	37	9	224

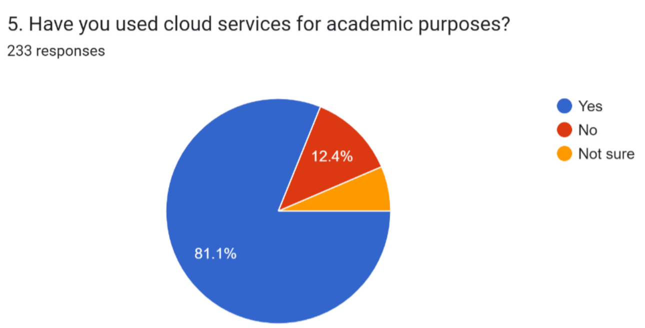

Figure 3. Use of Cloud Service by Survey Respondents.

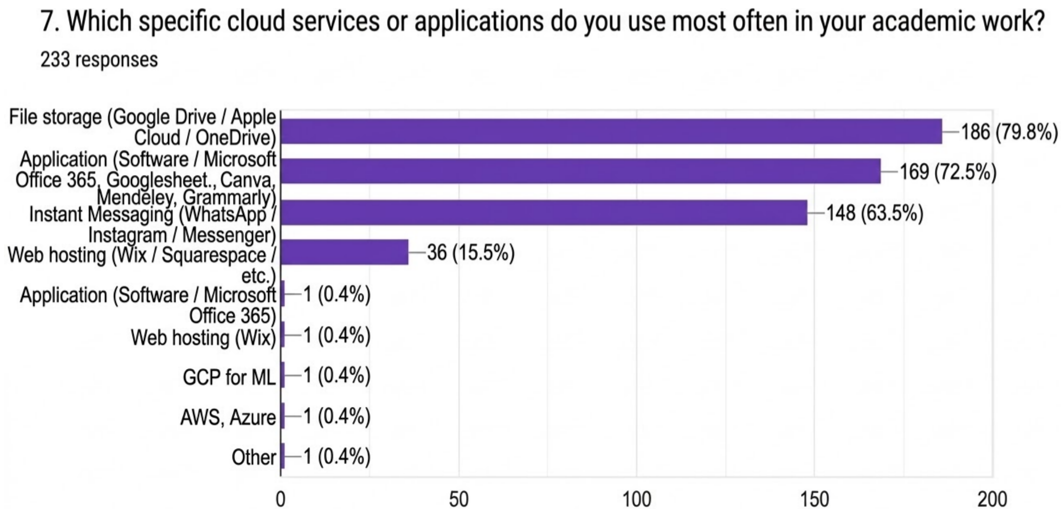

Figure 4. Use of Cloud Application by Survey Respondents.

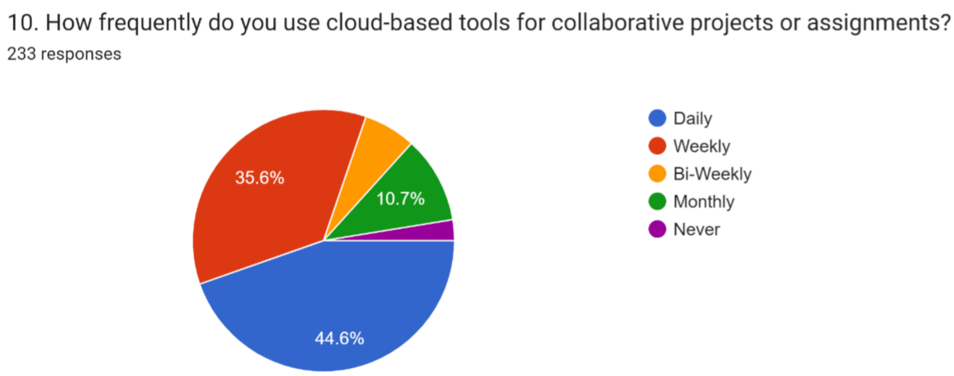

Figure 5. Frequency of Use of Cloud Technology.

Table 5. Frequency of using cloud technology would improve my academic performance.

		Improve Academic Performance			
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Extremely Unlikely	9	4.0	4.0	4.0
	Unlikely	9	4.0	4.0	8.0
	Neutral	52	23.2	23.2	31.2
	Likely	77	34.4	34.4	65.6
	Extremely Likely	77	34.4	34.4	100.0
	Total	224	100.0	100.0	

According to **Table 6**, students are very confident that CBT can assist them in their academic studies. The vast majority of respondents, 36.6% (82), indicated that it is extremely likely, and 34.4% (77) said it is likely, showing confidence in the idea that CBT makes academic work easier. However, 50 students, which is 22.3% of all survey respondents, remained neutral, indicating some level of uncertainty. Additionally, a smaller proportion of respondents, 7.7% (15), expressed doubts about the cloud technology's ability to make their studies easier.

Regarding **Table 7**, the majority of respondents—comprising 34.8% who are extremely likely and 37.5% who are likely—say it is easy to learn to operate cloud technology, while 21% of respondents remain neutral. Moreover, a smaller percentage of respondents—representing 6.7%—do not believe that it is easy to operate CBT. Overall, these survey data demonstrate persistent confidence among students in their ability to learn how to operate cloud technology in their academic studies.

Considering the frequency of cloud security influence (**Table 8**), it suggests that cloud security has a significant impact on students' decisions to accept and adopt CBT in academic studies. A substantial percentage of respondents (63.4%) agreed with the idea that cloud security influenced their decision. Moreover, 28.1% expressed a neutral opinion, indicating that many respondents were unsure about their decision. The remaining respondents suggested that cloud security features do not significantly influence their decision to accept and adopt CBT for academic purposes.

Based on the research outcomes, backup and storage features have a more favourable effect on respondents' decisions to adopt CBT in academic studies (**Table 9**). An overwhelming majority of 77.2% agreed with the argument that backup and storage facilities influence their decision. Furthermore, 17.9% took a neutral stance, suggesting that they were unsure about how backup and storage facilities would affect their choice. On the other hand, a smaller proportion of respondents, 4.9%, indicated that backup and storage features have little impact on their decision to adopt cloud-based services for academic studies.

Table 6. Frequency of using cloud technology would make it easier to do my academic studies.

Easier					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely Unlikely	7	3.1	3.1	3.1
	Unlikely	8	3.6	3.6	6.7
	Neutral	50	22.3	22.3	29.0
	Likely	77	34.4	34.4	63.4
	Extremely Likely	82	36.6	36.6	100.0
	Total	224	100.0	100.0	

Table 7. Frequency of learning to operate cloud technology would be easy for me.

Easy to Operate					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely Unlikely	7	3.1	3.1	3.1
	Unlikely	8	3.6	3.6	6.7
	Neutral	47	21.0	21.0	27.7
	Likely	84	37.5	37.5	65.2
	Extremely Likely	78	34.8	34.8	100.0
	Total	224	100.0	100.0	

Table 8. Frequency of cloud security influence.

Security					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely Disagree	4	1.8	1.8	1.8
	Disagree	15	6.7	6.7	8.5
	Neutral	63	28.1	28.1	36.6
	Agree	67	29.9	29.9	66.5
	Extremely Agree	75	33.5	33.5	100.0
	Total	224	100.0	100.0	

Table 9. Frequency of cloud storage influence.

Storage					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely Disagree	4	1.8	1.8	1.8
	Disagree	7	3.1	3.1	4.9
	Neutral	40	17.9	17.9	22.8

Table 9. *Cont.*

Storage					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Agree	84	37.5	37.5	60.3
	Extremely Agree	89	39.7	39.7	100.0
	Total	224	100.0	100.0	

The survey results (**Tables 10**) indicate that mobility significantly influences respondents' decision-making regarding the adoption of cloud technologies in their studies. The vast majority of respondents, 36.2%, strongly agreed, and 37.9% agreed with the statement that mobility affects their decision to adopt CBT in their academic pursuits. Meanwhile, an equal proportion of respondents, 2.2%, strongly disagreed and disagreed with this assertion.

Table 10. Frequency of cloud mobility influence.

Mobility					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Extremely Disagree	5	2.2	2.2	2.2
	Disagree	5	2.2	2.2	4.5
	Neutral	48	21.4	21.4	25.9
	Agree	85	37.9	37.9	63.8
	Extremely Agree	81	36.2	36.2	100.0
	Total	224	100.0	100.0	

The descriptive statistics (**Table 11**) for the Technology Acceptance Model (TAM) indicate a consistently positive perception of usefulness across all 224 participants, with mean scores ranging from 3.91 to 4.06 on a 5-point scale. Respondents particularly valued the technology's ability to help them complete tasks more quickly and increase productivity, while showing the highest consensus (lowest variance) regarding its impact on productivity.

Table 11. Descriptive Summary of TAM—Perceived Usefulness.

Descriptive Statistics								
Variable	**N**	**Range**	**Minimum**	**Maximum**	**Mean (Stat)**	**Mean (Std. Error)**	**Std. Deviation**	**Variance**
More Quickly	224	4	1	5	4.06	0.069	1.036	1.072
Improve Aca. Per	224	4	1	5	3.91	0.07	1.046	1.095
Increase Productivity	224	4	1	5	4.05	0.066	0.992	0.984
Effectiveness	224	4	1	5	3.95	0.067	1.008	1.016
Easier	224	4	1	5	3.98	0.067	1.009	1.017
Useful	224	4	1	5	4.03	0.068	1.013	1.026
Valid N (listwise)	224							

The descriptive statistics (**Table 12**) for Perceived Ease-of-Use indicate a strong positive reception among the 224 participants, with mean scores consistently high, ranging from 3.90 to 4.05 on a 5-point scale. Respondents found the technology particularly easy to use overall (M = 4.05) and highly conducive to their studies, supported by relatively low standard deviations that suggest a high level of agreement across the sample.

Table 12. Descriptive Summary of TAM—Perceived Ease-of-Use.

Descriptive Statistics								
Variable	**N**	**Range**	**Minimum**	**Maximum**	**Mean (Stat)**	**Mean (Std. Error)**	**Std. Deviation**	**Variance**
Easy to Operate	224	4	1	5	3.97	0.066	0.993	0.986
Easy for Study	224	4	1	5	3.99	0.062	0.93	0.865
Easy to Understand	224	4	1	5	3.90	0.065	0.965	0.932
Skillful	224	4	1	5	3.96	0.062	0.932	0.869

Table 12. *Cont.*

Descriptive Statistics								
Variable	**N**	**Range**	**Minimum**	**Maximum**	**Mean (Stat)**	**Mean (Std. Error)**	**Std. Deviation**	**Variance**
Easy to use	224	4	1	5	4.05	0.065	0.967	0.935
Valid N (listwise)	224							

The descriptive summary (**Table 13**) highlights that Storage (M = 4.10) and Mobility (M = 4.04) are the most influential factors driving cloud technology adoption, both maintaining high mean scores with relatively low variance. Conversely, Cost received the lowest mean score (M = 3.57) and the highest standard deviation (1.123), suggesting that while still viewed positively, there is less consensus among participants regarding its impact compared to technical benefits.

Table 13. Descriptive Summary of Factors Influencing Cloud Technology Acceptance and Adoption.

Descriptive Statistics								
Variable	**N**	**Range**	**Min**	**Max**	**Mean (Stat)**	**Mean (Std. Error)**	**Std. Deviation**	**Variance**
Security	224	4	1	5	3.87	0.068	1.016	1.031
On Demand Service	224	4	1	5	3.74	0.062	0.927	0.859
Scalabilty	224	4	1	5	3.84	0.06	0.899	0.808
Storage	224	4	1	5	4.10	0.062	0.925	0.855
Mobility	224	4	1	5	4.04	0.062	0.932	0.869
Cost	190	4	1	5	3.57	0.081	1.123	1.262
Valid N (listwise)	190							

5.1.2. Correlation Analysis

The Pearson correlation coefficient, represented by the sign "r", is used in this research. Correlations measure the strength and direction of the relationship between variables, while *t*-values and *p*-values help determine the significance of this relationship in hypothesis testing. Additionally, the r-value ranges from −1 (strongly negative relationship) to 1 (strongly positive relationship), with 0 indicating no direct link. A *t*-value below −1.96 or above 1.96 (at 95% confidence) signifies that the outcome is statistically significant. The probability of obtaining findings as extreme as those observed, assuming the null hypothesis is true, is also considered. A low *p*-value (usually less than 0.05) provides strong evidence against the null hypothesis, suggesting a meaningful link among the variables. The strength of evidence against the null hypothesis in statistical analysis is called "significance." If a low *p*-value indicates that the relationship among variables is statistically significant, it implies that the observed connection is unlikely to have occurred by chance. However, it is important to remember that correlation does not establish causation, and further studies may be required to determine causal relationships between parameters.

According to **Table 14**, the Pearson correlation coefficient, or the r-value of any two variables, is close to +1, indicating a strong positive relationship between them. Additionally, the *p*-value is always less than 0.05, confirming the significance. More precisely, there is a strong positive correlation between student acceptance and both perceived usefulness and ease of use, with a coefficient of 0.699 and *p*-values less than 0.05 in both cases. Furthermore, SAU demonstrates a robust positive correlation with SPU, where r = 0.893, $p < 0.001$, and SPE, where r = 0.774, $p < 0.001$, within the system. The research findings highlight the importance of perceived usefulness and ease of use in influencing student acceptance and performance, proving that cloud-based technologies that are more useful and easier to operate are more likely to be accepted by students and lead to improved outcomes.

Regarding **Table 15**, the correlation matrix examines the relationships between factors influencing cloud-based technology acceptance and adoption, including cost, security, on-demand service, scalability, storage, and mobility. Significant positive correlations are found between these variables, suggesting their interdependence in influencing CBT acceptance and adoption by tertiary students in NZ. According to the matrix, the Pearson correlation coefficient, the r-value, of any two variables ranges from 0.474 to 0.746, indicating the strength of the positive relationship between the two variables. Additionally, the *p*-value between them is always less than 0.05, confirming the significance.

Table 14. Correlation between Student Performance and Acceptance against Perceived Usefulness and Perceived Ease of Use.

Correlations					
		Student Acceptance with Usefulness (SAU)	**Student Acceptance with Ease of Use (SAE)**	**Student Performance Against Usefulness (SPU)**	**Student Performance against Ease of Use (SPE)**
Student Acceptance with Usefulness (SAU)	Pearson Correlation	1	0.699**	0.893**	0.774**
	Sig. (2-tailed)		<0.001	<0.001	<0.001
	N	224	224	224	224
Student Acceptance with Ease of Use (SAE)	Pearson Correlation	0.699**	1	0.652**	0.797**
	Sig. (2-tailed)	<0.001		<0.001	<0.001
	N	224	224	224	224
Student Performance Against Usefulness (SPU)	Pearson Correlation	0.893**	0.652**	1	0.783**
	Sig. (2-tailed)	<0.001	<0.001		<0.001
	N	224	224	224	224
Student Performance against Ease of Use (SPE)	Pearson Correlation	0.774**	0.797**	0.783**	1
	Sig. (2-tailed)	<0.001	<0.001	<0.001	
	N	224	224	224	224

Note: **: Correlation is significant at the 0.01 level (2-tailed).

Table 15. Correlation between Factors Influencing Cloud Technology Acceptance and Adoption.

Correlations							
		Cost	**Security**	**On-Demand Service**	**Scalability**	**Storage**	**Mobility**
Cost	Pearson Correlation	1	0.474**	0.547**	0.498**	0.449**	0.449**
	Sig. (2-tailed)		<0.001	<0.001	<0.001	<0.001	<0.001
	N	190	190	190	190	190	190
Security	Pearson Correlation	0.474**	1	0.620**	0.585**	0.550**	0.593**
	Sig. (2-tailed)	<0.001		<0.001	<0.001	<0.001	<0.001
	N	190	224	224	224	224	224
On-Demand Service	Pearson Correlation	0.547**	0.620**	1	0.746**	0.634**	0.608**
	Sig. (2-tailed)	<0.001	<0.001		<0.001	<0.001	<0.001
	N	190	224	224	224	224	224
Scalability	Pearson Correlation	0.498**	0.585**	0.746**	1	0.630**	0.644**
	Sig. (2-tailed)	<0.001	<0.001	<0.001		<0.001	<0.001
	N	190	224	224	224	224	224
Storage	Pearson Correlation	0.449**	0.550**	0.634**	0.630**	1	0.745**
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001		<0.001
	N	190	224	224	224	224	224
Mobility	Pearson Correlation	0.449**	0.593**	0.608**	0.644**	0.745**	1
	Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	
	N	190	224	224	224	224	224

Note: **: Correlation is significant at the 0.01 level (2-tailed).

Notably, on-demand service shows significant positive correlations with cost (r = 0.547, $p < 0.001$), security (r = 0.621, $p < 0.001$), scalability (r = 0.746, $p < 0.001$), storage (r = 0.634, $p < 0.001$), and mobility (r = 0.608, $p < 0.001$). Cost displays a moderate connection with security (r = 0.474, $p < 0.001$), on-demand service (r = 0.547, $p < 0.001$), scalability (r = 0.498, $p < 0.001$), storage (r = 0.449, $p < 0.001$), and mobility (r = 0.449, $p < 0.001$). Additionally, security has a positive correlation with on-demand services (r = 0.620, $p < 0.001$), scalability (r = 0.585, $p < 0.001$), storage (r = 0.550, $p < 0.001$), and mobility (r = 0.593, $p < 0.001$). Similarly, strong positive correlations are found between scalability and on-demand service (r = 0.746, $p < 0.001$), storage (r = 0.630, $p < 0.001$), and mobility (r = 0.644, $p < 0.001$), while there are moderate connections between scalability and cost (r = 0.498, $p < 0.001$) and security (r = 0.585, $p < 0.001$). The research findings indicate that cloud technology characteristics—such as cost, security, on-demand service, storage and backup facilities, scalability, and mobility—have a mutually supportive influence on cloud technology acceptance and adoption by tertiary students in NZ. This underscores the importance of these aspects collectively when it comes to cloud technology implementation decision-making processes.

5.1.3. Hypothesis Testing

In hypothesis testing, a significant *p*-value (<0.05) indicates that the regression model exhibits more systematic variation than non-systematic variation, implying that the findings are sufficiently explained. A *p*-value less than 0.05 signifies statistical significance, leading to the rejection of the null hypothesis and the acceptance of the research hypothesis.

The Model Summary tables show that the predictors explain the variance in cloud technology value in "R". The ANOVA table confirms the regression model's significance, indicating that the model fits the data well. The coefficients table reveals whether the research hypothesis is supported.

H1. *The perceived ease of use (PEU) of cloud-based technologies positively influences students' academic performance.*

The model summary (**Table 16**) indicates that the predictor, "Student Performance against Ease of Use," explains approximately 10.7% of the variance in cloud technology. The ANOVA table (**Table 17**) affirms the significance of the regression model (F = 26.627, $p < 0.001$), suggesting that the model fits the data well. The coefficients table (**Table 18**) shows the *t*-value is −5.160, supporting the research hypotheses.

Table 16. Model Summary of Student Performance Regression.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.327[a]	0.107	0.103	0.527

Note: a: predictors: (Constant), student performance against ease of use.

Table 17. ANOVA Results for Regression of Cloud Technology on Student Performance.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	7.388	1	7.388	26.627	<0.001[b]
	Residual	61.594	222	0.277		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), student performance against ease of use.

Table 18. Coefficients for the Regression of Cloud Technology on Student Performance.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.085	0.167		12.466	<0.001
	Student Performance against Ease of Use	−0.213	0.041	−0.327	−5.160	<0.001

Note: a: Dependent variable: Cloud technology.

Thus, hypothesis H1: Perceived ease of use (PEU) of cloud-based technologies positively influences students' academic performance has been proven.

The rejected hypothesis is

$H1_0$. *Perceived ease of use (PEU) of cloud-based technologies negatively influences students' academic performance.*

H2. *The perceived usefulness (PU) of cloud-based technologies positively influences students' academic performance.*

The model summary (**Table 19**) indicates that the predictor, "Student Performance against Usefulness," explains about 29.5% of the variance in cloud technology. The ANOVA table (**Table 20**) confirms the significance of the regression model (F = 21.156, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 21**) shows that the t-value is −4.600, which supports the research hypotheses.

Table 19. Model Summary for the Regression of Usefulness on Student Performance.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.295[a]	0.087	0.083	0.533

Note: a: Predictors: (Constant), student performance against usefulness.

Table 20. ANOVA Results for the Regression of Cloud Technology on Usefulness.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	6.002	1	6.002	21.156	<0.001[b]
	Residual	62.980	222	0.284		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), student performance against usefulness.

Table 21. Coefficients for the Regression of Cloud Technology on Usefullness.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.951	0.159		12.312	<0.001
	Student Performance against Usefulness	−0.178	0.039	−0.295	−4.600	<0.001

Note: a: Dependent variable: Cloud technology.

Thus, hypothesis H2: Perceived usefulness (PU) of cloud-based technologies positively influences students' academic performance, has been validated and accepted by respondents.

The rejected hypothesis is

$H2_0$. *The perceived usefulness (PU) of cloud-based technologies negatively affects students' academic performance.*

H3. *Perceived ease of use (PEU) positively influences students' acceptance of cloud-based technologies.*

The model summary (**Table 22**) indicates that the predictor, "Student Acceptance with Ease of Use," accounts for about 30.6% of the variance in cloud technology. The ANOVA table (**Table 23**) confirms the significance of the regression model (F = 22.876, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 24**) shows the t-value is −4.783, which supports the research hypotheses.

Thus, hypothesis H3: Perceived ease of use (PEU) positively affects students' acceptance of cloud-based technologies has been proved and accepted by respondents.

The rejected hypothesis is

$H3_0$. *Perceived ease of use (PEU) has a negative impact on students' acceptance of cloud-based technologies.*

H4. *Perceived usefulness (PU) positively influences students' acceptance of cloud-based technologies.*

The model summary (**Table 25**) indicates that the predictor, "Student Acceptance with Usefulness," explains approximately 28.4% of the variance in cloud technology. The ANOVA table (**Table 26**) confirms the regression model's significance (F = 19.488, $p < 0.001$), suggesting that the model fits the data well. The coefficients table (**Table 27**) shows the t-value is −4.415, supporting the research hypotheses.

Table 22. Model Summary for the Regression of Ease of Use on Student Acceptance.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.306[a]	0.093	0.089	0.531

Note: a: Predictors: (Constant), student acceptance with ease of use.

Table 23. ANOVA Results for the Regression of Cloud Technology on Student Acceptance and Ease of Use.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	6.444	1	6.444	22.876	<0.001[b]
	Residual	62.538	222	0.282		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), student acceptance with ease of use.

Table 24. Coefficients for the Regression of Cloud Technology on Student Acceptance and Ease of Use.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.953	0.153		12.763	<0.001
	Student Acceptance with Ease of Use	−0.176	0.037	−0.306	−4.783	<0.001

Note: a: Dependent variable: Cloud technology.

Table 25. Model Summary for the Regression of Usefulness on Student Acceptance.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.284[a]	0.081	0.077	0.534

Note: a: Predictors: (Constant), student acceptance with usefulness.

Table 26. ANOVA Results for the Regression of Cloud Technology on Student Acceptance and Usefulness.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	5.567	1	5.567	19.488	<0.001[b]
	Residual	63.415	222	0.286		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), student acceptance with usefulness.

Table 27. Coefficient for the Regression of Cloud Technology on Student Acceptance and Usefulness.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.870	0.147		12.733	<0.001
	Student Acceptance with Usefulness	−0.156	0.035	−0.284	−4.415	<0.001

Note: a: Dependent variable: Cloud technology.

Thus, hypothesis H4: Perceived usefulness (PU) positively influences students' acceptance of cloud-based technologies, has been validated and accepted by respondents.

The rejected hypothesis is

$H4_0$. *Perceived usefulness (PU) negatively influences students' acceptance of cloud-based technologies.*

H5. *Additional Cost (AC) negatively affects students' acceptance of cloud-based technologies.*

The model summary (**Table 28**) indicates that the predictor, "Cost," accounts for about 19.4% of the variance in cloud technology. The ANOVA table (**Table 29**) confirms the significance of the regression model (F = 7.382, $p < 0.007$), suggesting that the model is a good fit for the data. The coefficients table (**Table 30**) shows the *t*-value is −2.717, which supports the research hypotheses.

Thus, hypothesis H5: Additional Cost (AC) negatively affects students' acceptance of cloud-based technologies, has been validated and accepted by respondents.

The rejected hypothesis is

$H5_0$. *Additional Cost (AC) positively influences students' acceptance of cloud-based technologies.*

H6. *Perceived security (PS) positively influences students' acceptance of cloud-based technologies.*

The model summary (**Table 31**) indicates that the predictor, "Security," accounts for approximately 26.8% of the variance in cloud technology. The ANOVA table (**Table 32**) confirms the regression model's significance (F = 17.192, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 33**) shows a *t*-value of 12.780, supporting the research hypotheses.

Table 28. Model Summary for the Regression of Cloud Technology on Cost.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.194[a]	0.038	0.033	0.578

Note: a: Predictors: (Constant), cost.

Table 29. ANOVA Results for the Regression of Cloud Technology on Cost.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	2.468	1	2.468	7.382	0.007[b]
	Residual	62.843	188	0.334		
	Total	65.311	189			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), cost.

Table 30. Coefficient for the Regression of Cloud Technology on Cost.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.632	0.140		11.639	<0.001
	Cost	−0.102	0.037	−0.194	−2.717	0.007

Note: a: Dependent variable: Cloud technology.

Table 31. Model Summary for the Regression of Cloud Technology on Security.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.268[a]	0.072	0.068	0.537

Note: a: Predictors: (Constant), security.

Table 32. ANOVA Results for the Regression of Cloud Technology on Security.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	4.958	1	4.958	17.192	<0.001[b]
	Residual	64.024	222	0.288		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), security.

Table 33. Coefficient for the Regression of Cloud Technology on Security.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.809	0.142	12.780	<0.001	
	Security	−0.147	0.035	−0.268	−4.146	<0.001

Note: a: Dependent variable: Cloud technology.

The rejected hypothesis is:

$H6_0$. *Perceived security (PS) negatively influences students' acceptance of cloud-based technologies.*

H7. *On-demand service would favourably influence students' acceptance of cloud-based technologies.*

The model summary (**Table 34**) indicates that the predictor, "On Demand Service," accounts for approximately 28.5% of the variance in cloud technology. The ANOVA table (**Table 35**) confirms the significance of the regression model (F = 19.657, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 36**) shows the *t*-value as −4.434, which supports the research hypotheses.

Thus, hypothesis H7: On-demand service would positively influence students' acceptance of cloud-based technologies, has been proven and accepted by respondents.

The rejected hypothesis is

$H7_0$. *On-demand service could negatively impact students' acceptance of cloud-based technologies.*

H8. *Scalability has a positive impact on students' acceptance of cloud-based technologies.*

The model summary (**Table 37**) shows that the predictor, "Scalability," accounts for about 27.2% of the variance in cloud technology. The ANOVA table (**Table 38**) confirms the significance of the regression model (F = 17.729, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 39**) indicates the *t*-value is −4.211, which supports the research hypotheses.

Table 34. Model Summary for the Regression of Cloud Technology on On-Demand Service.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.285[a]	0.081	0.077	0.534

Note: a: Predictors: (Constant), on-demand service.

Table 35. ANOVA Results for the Regression of Cloud Technology on On-Demand Service.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	5.611	1	5.611	19.657	<0.001[b]
	Residual	63.371	222	0.285		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), on-demand service.

Table 36. Coefficient for the Regression of Cloud Technology on On-Demand Service.

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.881	0.149		12.654	<0.001
	On-Demand Service	−0.171	0.039	−0.285	−4.434	<0.001

Coefficients[a]

Note: a: Dependent variable: Cloud technology.

Table 37. Model Summary for the Regression of Cloud Technology on Scalability.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.272[a]	0.074	0.070	0.536

Note: a: Predictors: (Constant), scalability.

Table 38. ANOVA Results for the Regression of Cloud Technology on Scalability.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.102	1	5.102	17.729	<0.001[b]
	Residual	63.880	222	0.288		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), scalability.

Table 39. Coefficients for the Regression of Cloud Technology on Scalability.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.887	0.158		11.978	<0.001
	Scalability	−0.168	0.040	−0.272	−4.211	<0.001

Note: a: Dependent variable: Cloud technology.

Thus, hypothesis H8: Scalability positively influences students' acceptance of cloud-based technologies, has been proven and accepted by respondents.

The rejected hypothesis is

$H8_0$. *Scalability detrimentally influences students' acceptance of cloud-based technologies.*

H9. *Backup and Disaster Recovery features positively influence students' acceptance of cloud-based technologies.*

The model summary (**Table 40**) indicates that the predictor, "Storage," accounts for approximately 28.4% of the variance in cloud technology. The ANOVA table (**Table 41**) confirms the regression model's significance (F = 19.446, $p < 0.001$), suggesting that the model is a good fit for the data. The coefficients table (**Table 42**) shows the *t*-value is −4.410, which supports the research hypotheses.

Thus, hypothesis H9: Backup and Disaster Recovery features positively influence students' acceptance of cloud-based technologies, has been validated and accepted by respondents.

The rejected hypothesis is

H9. *Backup and Disaster Recovery features negatively influence students' acceptance of cloud-based technologies.*

H10. *Mobility has a positive influence on students' acceptance of cloud-based technologies.*

The model summary (**Table 43**) indicates that the predictor, "Mobility," explains approximately 27.6% of the variance in cloud technology. The ANOVA table (**Table 44**) confirms the significance of the regression model (F = 18.335, $p < 0.001$), suggesting the model fits the data well. The coefficients table (**Table 45**) shows the t-value is −4.282, which supports the research hypotheses.

Table 40. Model Summary for the Regression of Cloud Technology on Storage.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.284[a]	0.081	0.076	0.535

Note: a: Predictors: (Constant), storage.

Table 41. ANOVA Results for the Regression of Cloud Technology on Storage.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	5.556	1	5.556	19.446	<0.001[b]
	Residual	63.426	222	0.286		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), storage.

Table 42. Coefficients for the Regression of Cloud Technology on Storage.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.941	0.163		11.926	<0.001
	Storage	−0.171	0.039	−0.284	−4.410	<0.001

Note: a: Dependent variable: Cloud technology.

Table 43. Model Summary for the Regression of Cloud Technology on Mobility.

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.276[a]	0.076	0.072	0.536

Note: a: Predictors: (Constant), mobility.

Table 44. ANOVA Results for the Regression of Cloud Technology on Mobility.

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	5.263	1	5.263	18.335	<0.001[b]
	Residual	63.720	222	0.287		
	Total	68.982	223			

Note: a: Dependent variable: Cloud technology. b: Predictors: (Constant), mobility.

Table 45. Coefficients for the Regression of Cloud Technology on Mobility.

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.906	0.159		11.958	<0.001
	Mobility	−0.165	0.038	−0.276	−4.282	<0.001

Note: a: Dependent variable: Cloud technology.

Thus, hypothesis H10: Mobility positively affects students' acceptance of cloud-based technologies, has been proven and accepted by respondents.

The rejected hypothesis is:

$H10_0$. *Mobility negatively influences students' acceptance of cloud-based technologies.*

Table 46 presents the final results of the study's research model, showing that all ten proposed hypotheses were statistically supported, as every null hypothesis was rejected in favour of the alternative hypothesis. The findings confirm that core TAM variables, such as perceived ease of use and usefulness, significantly influence both academic performance and technology acceptance. Furthermore, external factors—including security, scalability, mobility, and cost—were all validated as critical determinants in the adoption of cloud-based technologies among students.

Table 46. Summary of Hypothesis.

Hypothesis	Null Hypothesis	Alternative Hypothesis
H1. *The perceived ease of use (PEU) of cloud-based technologies positively influences students' academic performance.*	Rejected	Accepted
H2. *The perceived usefulness (PU) of cloud-based technologies positively influences students' academic performance.*	Rejected	Accepted
H3. *Perceived ease of use (PEU) positively influences students' acceptance of cloud-based technologies.*	Rejected	Accepted
H4. *Perceived usefulness (PU) positively influences students' acceptance of cloud-based technologies.*	Rejected	Accepted
H5. *Additional Cost (AC) negatively affects students' acceptance of cloud-based technologies.*	Rejected	Accepted
H6. *Perceived security (PS) positively influences students' acceptance of cloud-based technologies.*	Rejected	Accepted
H7. *On-demand service would favourably influence students' acceptance of cloud-based technologies.*	Rejected	Accepted
H8. *Scalability positively influences students' acceptance of cloud-based technologies.*	Rejected	Accepted
H9. *Backup and Disaster Recovery features positively influence students' acceptance of cloud-based technologies.*	Rejected	Accepted
H10. *Mobility has a positive influence on students' acceptance of cloud-based technologies.*	Rejected	Accepted

6. Discussions

Cloud computing is an emerging technique in enterprise computing. The main aim of cloud computing is to lessen the processing load on users [38]. It is becoming popular because of its cost-efficiency, ease of use, and seemingly infinite resources [39]. Based on the survey findings in this study, a theoretical model can be developed showing how features of cloud technology such as on-demand service, security, scalability, storage and backup, and mobility affect the acceptance and adoption of cloud-based technologies by New Zealand tertiary students. Firstly, it is evident how crucial backup and storage facilities are to cloud computing; a significant percentage (78%) of respondents agreed that these free or additional services positively influence their choice. Cloud security is another vital factor, with over 70% of respondents agreeing it positively impacts their decision to adopt. Conversely, cloud cost has a negative effect on their willingness to use cloud computing. Additionally, on-demand services, scalability, and mobility are recognised as key characteristics, with students strongly agreeing on their importance in decision-making.

Furthermore, perceived ease of use and perceived usefulness influence the adoption of cloud technologies in educational settings. This research revealed that cloud-based technologies offer several benefits for tertiary students in NZ. One respondent mentioned "to run ml (machine learning) models." Specifically, this study found that cloud-based technologies enhance students' academic pursuits in many ways.

The phrase "cloud computing" has become a significant term in information technology (IT) [2]. Despite a substantial number of survey respondents (12%) admitting that they haven't utilised cloud computing services for academic purposes and another 7% expressing uncertainty, it is noteworthy that all respondents reported using some form of cloud service when asked about specific cloud services or applications they have employed in their academic work. Furthermore, when questioned about the main reason for adopting cloud technology in their academic studies, respondents provided multiple reasons for its use. Given their widespread use among students, the terms "cloud services" or "cloud computing" could be used interchangeably.

Considering the research questions, the proposed hypotheses for RQ1 and RQ2 align with Research Question 1. They offer insights into how New Zealand tertiary education students perceive, accept, and adopt cloud technology in their studies. Additionally, the features of cloud computing influence their decisions to incorporate cloud-based technologies into their academic activities.

Research Question 1 examined students' perceptions, acceptance, and adoption of cloud technology. The hypotheses for perceived ease of use (PEU) and perceived usefulness

(PU), including H1, H2, H3, and H4, directly address this question by exploring how these factors influence students' views of cloud technology, their willingness to accept it, and the extent to which they utilise it in their academic work.

Research Question 2 (RQ2) aims to examine the features of cloud computing technologies that influence students' decisions to incorporate cloud services into their studies. This question investigates specific characteristics, functions, and factors of cloud-based technologies that affect students' preferences and choices. The hypotheses for additional cost (H5), perceived security (H6), on-demand service (H7), scalability (H8), backup and disaster recovery (H9), and mobility (H10) directly address this by examining particular cloud technology features and their impact on student acceptance.

In short, cloud-based technology is widely used in students' academic studies and highlights its benefits, including on-demand services, scalability, accessibility, automatic updates and maintenance, data security, disaster recovery, mobility, collaboration, and cost-effectiveness. 82% of respondents said they used cloud services for academic purposes and that they enhance learning experiences and improve academic performance.

Eight factors were considered when developing ten hypotheses to assess students' acceptance and adoption of cloud technology in New Zealand tertiary education. Based on the survey results, the research hypotheses are confirmed to be valid. Data findings indicate that postsecondary students in New Zealand have a positive perception of cloud computing and are willing to incorporate it into their academic pursuits.

7. Implications of Study

Research findings of this study are important for many stakeholders, including students, educational institutions, service providers, and policymakers. Understanding the variables affecting tertiary students' acceptance and adoption of cloud technologies helps stakeholders focus on improving the use of these applications to enhance educational outcomes and experiences. More importantly, these findings can assist students in recognising the benefits of cloud-based technologies in their academic pursuits. Students can make more informed choices about the tools, applications, and technologies they use for learning and collaboration.

Cloud computing is categorised into three main types: applications, platforms, and infrastructure. Each category addresses specific needs and offers various solutions to students worldwide [38]. The findings contribute to the existing research on accepting and adopting cloud-based technology in education, especially among university students. Researchers can utilise this data for further studies on relevant topics, such as security and privacy in cloud computing, as well as performance optimisation and cloud architecture.

Cloud computing facilitates an integrated platform for pull-based, on-demand service delivery that can be accessed by users worldwide at any time [30]. Technology providers offering cloud-based products and solutions might use these insights to better tailor their offerings to meet the demands of students in New Zealand or even globally. Understanding the components that influence acceptability and adoption can help them design and market a more effective approach in the educational sector.

The public cloud is evolving, expanding, and diversifying its services as cloud providers compete fiercely for market dominance. Consequently, vendors now offer more than just standard computing and storage instances. Instead, they provide cloud-based technologies at minimal costs to attract a larger user base. Therefore, service providers can utilise these research findings to deliver affordable solutions to tertiary students, encouraging wider adoption of CBT.

Educational organisations can design their educational services and programmes to efficiently utilise cloud-based technologies in enhancing the overall quality of student experiences and academic studies. Research findings from this study can be considered by the education sector and government policymakers when formulating policies on integrating technology into learning environments. They can prioritise resources, funding, and support for initiatives aimed at increasing the use of CT for educational purposes by recognising the positive effects on student learning outcomes.

Cloud computing is now among the emerging technological trends [2]. The rapid pace of technological breakthroughs in the cloud computing ecosystem continuously expands. Due to its swift growth, students may be unfamiliar with cloud technology for various reasons, such as limited exposure or access, security concerns, cultural or institutional factors, and perceptions of complexity. As the importance of CT grows, there is an increased focus on learning tools and user-friendly interfaces to help bridge the knowledge gap and make the technology more accessible to students. It is crucial to educate students and raise awareness about the benefits of cloud technology through training sessions, workshops, webinars, online courses, infographics, visual aids, collaboration and community events, mentoring, and coaching.

8. Theoretical Contributions of Findings

8.1. Theoretical Contribution and Extension of TAM

This study makes several theoretical contributions to the literature on technology adoption in higher education. First, it extends the Technology Acceptance Model (TAM) by demonstrating its applicability to cloud computing adoption within a developed, small-market context. While prior studies have predominantly validated TAM in generic or developing-country settings [40–42], the present findings confirm that perceived usefulness and perceived ease of use remain robust predictors of cloud technology adoption among New Zealand tertiary students. This contextual extension enhances the theoretical generalisability of TAM and responds to calls for more geographically diverse validation of technology acceptance models.

8.2. Integrating Cloud-Specific Characteristics into TAM

Second, this study advances theory by integrating cloud-specific qualities into a TAM-based framework, thereby surpassing traditional, technology-neutral acceptance models. Consistent with earlier conceptual work [43], the findings indicate that factors such as security, cost efficiency, scalability, and on-demand accessibility have a significant impact on adoption behaviour. Theoretically, this shows that TAM alone may be inadequate to fully understand user decision-making in cloud environments and that context-specific technological features play a complementary role. By empirically validating an integrated model, this study helps refine TAM and supports a more detailed, context-aware approach to technology acceptance research in higher education.

8.3. Linking Technology Acceptance to Academic Performance Outcomes

Third, and most importantly, this study advances theory by empirically linking cloud computing adoption to students' academic performance. Existing research has mostly regarded technology acceptance as an ultimate outcome, focusing on intention to use or user satisfaction [44, 45]. In contrast, the present study considers academic performance as a significant result of technology acceptance, thereby bridging the gap between information systems adoption theory and educational outcomes research. This integration expands TAM beyond mere behavioural intention and use, aligning it with learning theory perspectives that emphasise technology as a facilitator of active learning and knowledge construction [46, 47]. Consequently, the study presents a theoretically enriched model that links acceptance, usage, and performance within a unified explanatory framework.

9. Conclusions

Cloud computing provides faster innovation, flexibility, and economic scalability by delivering IT services (server, storage, database, network, software, analysis, and machine intelligence) across the cloud [48]. In response to this growing demand, cloud computing has been developed over the past decade and has become a profitable industry for enterprises, offering students easy access to cloud-based technologies with or without cost [35]. The study shows that cloud computing has become an influential force within the tertiary student community in New Zealand regarding their academic studies, and various factors affect their acceptance and adoption.

This study has shown that the acceptance and adoption of cloud-based technologies depend on factors such as perceived usefulness, perceived ease of use, additional costs, cloud security, on-demand services, scalability, storage and backup facilities, and mobility. More importantly, using CBT enhances students' academic performance. Ten hypotheses developed in the study were supported by the research findings and suggest favourable effects on acceptance and adoption, indicating that students value CBT for its benefits. Overall, the research found that tertiary students in New Zealand are willing to incorporate cloud technology into their academic work because of the expected advantages of usefulness and ease of use.

In short, this study makes novel contributions to technology adoption research by expanding the Technology Acceptance Model beyond its usual focus on behavioural intention and usage. By incorporating cloud-specific features into the TAM framework and empirically linking cloud computing adoption to academic achievement, the study offers a more comprehensive explanation of technology use in higher education environments. Additionally, the findings provide new empirical evidence from a developed, small-market setting, thereby improving the contextual generalisability of existing adoption models. Overall, these contributions enhance understanding of cloud computing adoption by illustrating how acceptance mechanisms lead to measurable educational outcomes.

Author Contributions

All authors contributed equally to the conception, design, data collection, analysis, and writing of this study. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

Informed consent was obtained from all human participants.

Data Availability Statement

The data used in this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

AI Use Statement

The authors used ChatGPT (OpenAI) for language refinement and take full responsibility for verifying the accuracy and integrity of the manuscript.

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