

The Reality of Employing Cloud Computing in Education: (A Field Study at the Higher Institute of Science and Technology \Kikla)

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واقع توظيف الحوسبة السحابية في العملية التعليمية لطلاب التعليم العالي
(دراسة ميدانية على المعهد العالي للعلوم والتقنية / ككلا)

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Abstract:

This study aims to identify the reality of employing cloud computing in the educational process for higher education students at the Higher Institute of Science and Technology in \ Kikla. The study adopted the descriptive approach using the social survey method, as it is appropriate for the nature of the study. A questionnaire was used as the primary tool for data collection, distributed to a sample of (84) male and female students. The results showed that the level of employing cloud computing in the educational process was moderate, while its perceived importance was high from the students' perspective, reflecting a gap between perception and practice. The results also revealed significant challenges hindering actual use, most notably the high cost of some cloud services and a lack of the knowledge or training necessary to use them efficiently. These findings suggest the necessity of adopting educational and training strategies that contribute to enhancing the actual use of cloud computing by developing infrastructure, increasing students' digital competencies, and systematically integrating these applications into educational practices.

Keywords: Cloud Computing, Educational Process, Higher Institute of Science and Technology-Kikla.

المخلص

تهدف هذه الدراسة إلى التعرف على واقع توظيف الحوسبة السحابية في العملية التعليمية لدى طلاب التعليم العالي بالمعهد العالي للعلوم والتقنية ككلا. اعتمدت الدراسة على المنهج الوصفي باستخدام أسلوب المسح الاجتماعي، نظراً لملاءمته لطبيعة الدراسة، كما تم استخدام الاستبانة كأداة رئيسية لجمع البيانات، وذلك على عينة مكونة من (84) طالباً وطالبة. أظهرت النتائج أن مستوى توظيف الحوسبة السحابية في العملية التعليمية جاء بدرجة متوسطة، في حين جاءت درجة أهميتها مرتفعة من وجهة نظر الطلبة، مما يعكس وجود فجوة بين الإدراك والتطبيق. كما كشفت النتائج عن وجود تحديات مرتفعة تعيق الاستخدام الفعلي، تمثلت أبرزها في ارتفاع تكلفة بعض الخدمات السحابية، وضعف المعرفة أو التدريب اللازم لاستخدامها بكفاءة. وتشير هذه النتائج إلى ضرورة تبني استراتيجيات تعليمية وتدريبية تساهم في تعزيز الاستخدام الفعلي للحوسبة السحابية، من خلال تطوير البنية التحتية، ورفع الكفايات الرقمية لدى الطلبة، ودمج هذه التطبيقات ضمن الممارسات التعليمية بشكل منهجي.

Introduction

The higher education sector is witnessing radical transformations as a result of accelerating technical developments, which forces educational institutions to adopt modern methods to ensure the quality of education and keep pace with the requirements of the era. Cloud computing is considered one of the most prominent of these technologies, as it provides enormous capabilities to improve the educational process by providing easy access to educational resources, enhancing collaboration between students and faculty members, and reducing operational costs.

As the trend towards e-learning and distance learning has become a necessity required by the knowledge society, and with the increasing focus on this sector of education, and in light of the limited capacities of personal computers, the high cost of infrastructure, and the difference and distance in the locations of information sources—whether human or material—and the difficulty of accessing them directly, the need to turn toward cloud computing technology has become urgent. It represents a new solution to these problems, where students can communicate and exchange information from anywhere, at any time, and from any device connected to the Internet (Hayam Hayek, 2013).

One of the features that distinguishes cloud computing is the independence of the device used and the location, which enables users to access the service using an appropriate web browser, regardless of their location or the electronic device used (Al-Hayyan, 2019). However, there is still a discrepancy between the theoretical capabilities of cloud computing and the reality of its use in higher education institutions, especially at the Higher Institute of Science and Technology in Kikla. From this perspective, this research aims to study the reality of employing cloud computing at the Higher Institute of Science and Technology in Kikla, with the goal of understanding the extent of its use, its impact, and the challenges it faces.

2. The Study Problem

Higher education faces increasing challenges in providing a stimulating and effective educational environment for students. Cloud computing is considered one of the promising technologies that can contribute to addressing these challenges. However, there is still ambiguity regarding the effectiveness of its use in this context. Therefore, this study aims to examine the reality of employing cloud computing in higher education institutions, analyze the factors that affect its success, and evaluate its impact on learning outcomes. Through the researcher's work in technical and vocational education, it was noted that students' use of cloud computing applications is limited despite their importance, and some do not even know what cloud computing is. Despite the great potential offered by cloud computing in improving the educational process, there is a lack of studies investigating the reality of its use in higher education institutions in Libya, especially from the point of view of students and faculty members. Therefore, this study seeks to explore this reality and identify the challenges and obstacles facing its use, in addition to evaluating its impact on the quality of education and the students' learning experience.

Based on the above, the idea for this study emerged, seeking to determine the reality of employing cloud computing in the educational process for higher education students (**a field study at the Higher Institute of Science and Technology in Kikla**). The problem of the study can be summarized in the following main question:

What is the reality of employing cloud computing in the educational process for higher education students?

The following sub-questions branch from the main question of the study:

1. What are the areas of employing cloud computing in the educational process for higher education students?
2. What is the importance of employing cloud computing in the educational process for higher education students?
3. What are the challenges of employing cloud computing in the educational process for higher education students?

3. Significance of the Study

The importance of the study lies in the following points:

- The study contributes to providing realistic information about the employment of cloud computing at the Institute, which helps the administration make informed decisions regarding the adoption and development of this technology.
- The study adds to scientific knowledge in the field of using technology in higher education and provides a database for other researchers.
- The importance of this study focuses on the Higher Institute of Science and Technology in \Kikla and improving the quality of education within it, which benefits the institute's graduates and the local community and contributes positively to the development of educational outcomes and society as a whole.
- Studying the challenges of employing cloud computing in the educational process for higher education students.

4. Objectives of the Study

This study aims mainly to examine the reality of employing cloud computing in the educational process at the Higher Institute of Science and Technology in \Kikla. To achieve this objective, the study seeks to achieve the following sub-objectives:

1. Identify the areas of employing cloud computing in educational activities for students of the Higher Institute.
2. Identify the importance of employing cloud computing in terms of student interaction and the quality of educational content.
3. Analyze the challenges and obstacles that limit the optimal utilization of cloud computing at the Institute, whether technical, human, or organizational.
4. Provide practical recommendations to the Institute's administration to improve the employment of cloud computing in the educational process and overcome the obstacles facing its use.

5. Scope of the Study

5.1 Objective Scope: This study is limited to attempting to identify the reality of employing cloud computing in the educational process at the Higher Institute of Science and Technology in \Kikla.

5.2 Human Scope: Students of the Higher Institute of Science and Technology in \Kikla.

5.3 Spatial Scope: The Higher Institute of Science and Technology in \Kikla.

5.4 Temporal Scope: The study was applied during the first semester of the (2025/2026) academic year

6. Study Terms

- **Cloud Computing:** An emerging and evolving technology that provides information to users via the Internet for a specific fee. The services and infrastructure of cloud computing are owned by a third party called cloud service providers (Ben Said, Amin & Nadia Abdul Rahim, 2019).
- **Educational Process:** A group of organized and coordinated activities and procedures aimed at meeting educational needs within the conditions and goals defined by higher education in the country. The educational process is based on fundamental principles, including democracy, science, and humanity, and aims to provide the learner with many educational skills that make their personality stronger and more balanced, and contributes to providing job opportunities (Alaa Jaber, 2018).
- **Higher Institute of Science and Technology \Kikla:** A non-profit technical higher education institution established based on Cabinet Resolution No. (278) of 2014 AD. It is affiliated with the Administration of Technical Higher Institutes at the National Board for Technical and Vocational Education - Ministry of Education in Libya. The duration of study at the Institute is three years, and the student is awarded a Higher Diploma upon passing. Studies at the Institute began in the fall semester of 2015 AD (Kikla Institute, 2023).

7. Previous Studies

A study conducted by **Yahya Abdul Razzaq Qatran** in 2019 aimed to determine the use of cloud computing in education by Yemeni university students and their attitudes toward it, as well as the impact of demographic variables (gender, university type, major, computer training, and educational level) on their cloud computing usage, barriers to usage, and attitudes toward its use in education. A questionnaire consisting of (63) items was prepared, covering three themes: uses of cloud computing in education, barriers to its use, and attitudes toward it. A random sample of (258) students from Yemeni public and private universities across various academic stages (Bachelor's, Master's, and PhD) was selected. The results showed that the level of cloud computing usage among Yemeni university students in education was moderate. The most frequent usage was "I obtain books and references via the internet," while the least frequent was "I save my photos on the internet." The results also confirmed that the level of barriers to using cloud computing in education among Yemeni university students was high, with the most significant barrier being "power outages on which devices depend," while "lack of modern equipment (computers and mobile phones)" was viewed as the least significant barrier. The study also concluded that the level of attitudes toward using cloud computing in education was moderate; the most positive attitude was "I believe cloud computing facilitates access to information," while the least was "I feel that using cloud computing is a waste of time." The results confirmed that there was no significant impact of the demographic variables (gender, university type, major, computer training, and educational level) on students' cloud computing usage, barriers to usage, or attitudes toward its use in education.

The study by **Lama Ababtain & Ahmed Al-Dreweesh** in (2021), titled "The Reality of Employing Cloud Computing in Education among Female Students at Shaqra University in Saudi Arabia," adopted a descriptive approach. A validated questionnaire was applied during the second semester of the 2013-2014 academic year to a random sample of 100 female students from the College of Science and Arts in **Shaqra** and the College of Science and Arts in **Sajer**. The results showed that the female students agreed on the use of cloud computing technologies in education across multiple fields to a high degree. The study also identified the importance of employing cloud computing in education and determined the factors that constitute a barrier to the use of these technologies by female students at **Shaqra** University.

A recent study by **Farid Amer** (2023) focused on the reality of using cloud computing applications and services among students and faculty members at the College of Oil and Minerals, as a case study representing the reality in all Yemeni universities. The researcher chose a descriptive approach with a random sample to conduct this study on students and faculty at the College of Oil. The study instrument was a questionnaire consisting of a number of questions addressing various aspects of the research topic, divided into three themes: the first theme measured the reality of usage of cloud storage applications in education by students and faculty; the second measured the extent of awareness among students and faculty regarding the importance of using cloud storage services in the educational process; and the third measured the barriers to using cloud storage applications in education. 124 questionnaires were distributed; 116 copies were retrieved, with 100 copies valid for analysis and the remaining 16 missing or invalid. The study reached the following results: Cloud computing assists in the educational process through collaborative student participation in work, as well as the use of cloud storage in education and teacher training, in addition to assessing their awareness of using cloud computing applications. Finally, a set of recommendations was proposed to mitigate the barriers to implementing cloud computing services.

In the most recent study evaluating the impact of cloud e-learning in higher education, an experimental study by researcher **Lillian-Yee-Kiaw Wang** in (2024) at **Monash** University, Malaysia, adopted an experimental approach using pre-test and post-test methods. The study sample consisted of (285) students. The study concluded that changes in students' perceptions vary over time, indicating divergent student perceptions regarding the use of the cloud e-learning module. The analysis clearly reveals that the use of cloud e-learning improved students' learning performance in theoretical subjects. This research is useful for educators and ICT practitioners in making informed decisions regarding the adoption of appropriate ICT infrastructures to support e-learning in higher education.

8. Commentary on Previous Studies

After reviewing the differences and points of consensus among the previous studies related to the topic of the current research, it can be stated that the researcher was able to identify key aspects of value for the current study. This includes clarifying the research problem and its importance, preparing and constructing the study tools, as well as benefiting from the statistical methods employed in previous studies, the method of questionnaire construction, and the determination of sample size.

The results of previous studies indicated that the reality of employing cloud computing in education among female students at **Shaqra** University in Saudi Arabia was extensive and across multiple fields, as noted in the study by (**Lama Ababtain & Ahmed Al-Dreweesh**, 2021). Other studies, such as that by (**Yahya Abdul Razzaq Qatran**, 2020), considered the level of students' attitudes toward using cloud computing in education in Yemeni universities to be moderate. That study also concluded that the level of barriers to using cloud computing in education among Yemeni university students was high, with the most significant barrier being "power outages on which devices depend," while "lack of modern equipment such as computers and mobile phones" was considered the least significant barrier from their perspective. Meanwhile, the studies by (**Farid Amer**, 2023) and (**Lillian-Yee-Kiaw Wang**, 2024) found that cloud computing assists in the educational process through collaborative student participation, the use of cloud storage in education, and teacher training. They further concluded that the use of cloud e-learning led to improved learning performance for students in theoretical subjects.

Theoretical aspect

Concept of Cloud Computing

Cloud computing is a collection of hardware, networks, storage, and services, and all aspects that enable the provision of computing as a service. These cloud services include providing infrastructure, software, and storage over the Internet (either as separate components or as a complete platform) based on user demand (Hurwitz et al., 2010).

(Vennam, 2020) indicated that cloud computing is on-demand access via the Internet to computing resources such as applications, servers (physical and virtual), data storage, development tools, and network capabilities, all of which are hosted in data centers managed by a cloud service provider.

Types of Cloud Computing

Cloud computing is divided into two main categories based on the deployment model:

1. **Public Cloud:** Refers to cloud services provided over the Internet to the general public. Major companies such as Amazon and Google possess massive infrastructure that allows for the provision of computing resources in a flexible manner, which contributes to reducing time, effort, and cost for users (Kapil, 2017).
2. **Private Cloud:** A cloud dedicated to a single organization, accessed through the organization's internal network. The organization is responsible for managing and operating the systems and infrastructure used to provide the service (Al-Mutairi, 2018).
3. **Hybrid Cloud:** Combines the characteristics of both public and private clouds. An organization can run some services within its own infrastructure, while other services are run via the public cloud, providing greater flexibility in resource management (Kapil, 2017).
4. **Community Cloud:** In this type, the cloud infrastructure is shared among a group of organizations that share common goals or requirements, such as educational or governmental institutions. It is managed either by these organizations or by an external party (Namasudra, 2018).

Cloud Service Models

Cloud computing provides a set of integrated services offered to users on-demand via the Internet. These services are classified into three main models: **Software as a Service (SaaS)**, **Platform as a Service (PaaS)**, and **Infrastructure as a Service (IaaS)**.

1. **Software as a Service (SaaS):** This model is considered one of the simplest and most well-known models of cloud computing, where applications are provided to end-users over the Internet without the need for local installation on their devices. These applications are run, hosted, and managed by the service provider, allowing users to access them easily through a browser (Modisane & Jokonya, 2021).
2. **Platform as a Service (PaaS):** This model provides an integrated environment for application development. It allows users to access programming tools and development languages offered by the service provider, enabling them to build, test, and deploy applications without the need to manage the underlying infrastructure (Zouhri & Rehali, 2016).

3. **Infrastructure as a Service (IaaS):** This model allows users to rent basic computing resources, such as servers, memory, storage space, and networks. These resources can be allocated according to their needs, and the cost is calculated based on the actual usage (Vall, 2017).

Benefits of Cloud Computing in Education

1. **Ease of Access:** Availability of educational materials at any time and from any device, without geographical restrictions.
2. **Enhancing Collaboration:** Enabling immediate interaction between students and teachers and easy sharing of resources.
3. **Saving Time and Flexibility:** Accomplishing educational tasks quickly and the possibility of learning and working remotely.
4. **Supporting Distance Learning:** Providing learning opportunities for students unable to attend in-person.
5. **Reducing Costs:** Minimizing the need for expensive hardware and relying on digital resources instead of paper.
6. **Flexible and Secure Storage:** Providing large storage spaces at low costs with automatic data backup.
7. **Enhancing Cyber security:** Protecting data and controlling user access permissions. (Al-Mubarak, 2021)

Prominent Cloud Computing Applications in Education

Google Classroom: An educational platform that facilitates the creation of virtual classrooms, the distribution and electronic grading of assignments, and direct communication with students.

- **Google Drive:** Provides space for file storage, as well as the creation and sharing of documents, spreadsheets, and data.
- **Dropbox:** Widely used for storing text files, images, and videos, allowing access from any device (Khafaji, 2012).

Challenges Facing Cloud Computing in the Educational Process

Despite the benefits, educational institutions face several challenges:

1. **Internet Reliance:** Constant access requires a strong connection; service interruptions have a negative impact on the continuity of learning (Nagar, 2023).
2. **Security and Privacy:** Concerns regarding the breach of sensitive educational data when stored by a third party (Harrison, 2023).
3. **Reduced Control:** Loss of direct control over infrastructure and the scheduling of software updates (Ma, 2021).
4. **Initial Costs:** Despite long-term savings, the migration process and staff training can be costly at the outset (Hayek, 2021).

First. Validity of the Study Tool (Questionnaire)

Validity and Reliability of the Questionnaire:

1. Validity: Validity of the questionnaire refers to ensuring that it measures what it was designed to measure. To verify the validity of the questionnaire used in the study and to ensure the accuracy, consistency, clarity, and appropriateness of its items for the research environment, the researcher conducted the following validity tests:

- **Face Validity (Expert Review):** To ensure the validity of the questionnaire, the researcher presented it to a group of panels of Experts and specialists in Libyan universities to obtain their opinions and suggestions regarding the questionnaire form. Their expertise was utilized to panel of Expert the items

used and their suitability for application in the study. The panel of Experts were requested to evaluate the following:

- The credibility and validity of the items and their wording.
- The extent to which the items belong to the variable or scale under which they are categorized.
- Adding, modifying, or deleting items as they deemed appropriate.

Based on the valuable feedback received from the panel of Experts, some modifications were made to the questionnaire in its final form.

2. Criterion Validity (Discriminant Validity):

Validity refers to ensuring that the questionnaire questions measure what they were intended to measure. To verify the validity of the questionnaire for the purpose of measuring the reliability of the study instrument, 20 copies were distributed. The Statistical Package for the Social Sciences (SPSS) was used to conduct the following:

- **Discriminant Validity:**

The scores of the pilot study scale were arranged in descending order. 27% of the highest values and 27% of the lowest values were selected. Subsequently, the differences between the two groups were calculated using the T-test. Independent samples T-test was utilized to determine if there was a statistically significant difference between the mean scores of the low group and the mean scores of the high group. This was done by aggregating the total scores of the items for each Axis, thereby facilitating a discriminant comparison.

This involved calculating the T-test value to determine the significance of the differences between the mean of the lower quartile (27% of the lowest values) and the mean of the higher quartile (27% of the highest values) for all study scales, as follows:

Table 1: Results of the T-Test for Discriminant Validity

Axis	27% Bottom		27% Top		T-value	Significance Level
	(Mean/SD)	Standard Deviation	(Mean/SD)	Standard Deviation		
Areas of Cloud Computing Employment	2.37	0.3289	4.26	0.3097	66.000	0.000
Importance of Cloud Computing Employment	1.75	0.3062	4.25	0.1768	31.623	0.000
Challenges of Cloud Computing Employment	1.96	0.5177	4.44	0.1673	14.224	0.000

It is evident from Table No. (1) that the calculated (T) values for the comparison between the lower quartile and the upper quartile for the scale Axis—which are (66.000, 31.623, 14.22470)—were greater than the tabulated (T) value of (2.776). Furthermore, the corresponding significance levels (p-values) were less than (0.05), which is the significance level adopted in this study, reaching (0.000, 0.000, 0.000). Consequently, it can be stated that there are statistically significant differences between the lower and upper quartiles across all Axis of the scale.

Cronbach’s Alpha α :

Cronbach’s Alpha is considered one of the important statistical tests for analyzing questionnaire data, as it indicates the extent of the questionnaire’s reliability (Al-Bayati, 2005, p. 49). The value of the Cronbach’s Alpha coefficient ranges between (0 and 1) and demonstrates the correlation between the responses of the sample members. When the coefficient value is zero, it indicates an absolute lack of correlation between responses,

whereas a value of one indicates a perfect correlation. It is widely recognized that the minimum acceptable value for Cronbach's Alpha α is 0.6, while the optimal range is between (0.7 to 0.8), and any value exceeding 0.8 is considered superior, as shown in Table No. (2):

Table 2: Results of Cronbach's Alpha α Test

Axis	No. of Items	Cronbach's Alpha (Reliability)	Validity (Sqrt of Alpha)
Areas of Cloud Computing Employment	7	0.821	90.61%
Importance of Cloud Computing Employment	4	0.832	91.21%
Challenges of Cloud Computing Employment	5	0.841	91.71%

It is evident from Table No. (2) that the reliability coefficients (*Cronbach's Alpha α*) for the scale Axis were all high and statistically acceptable. The reliability coefficient for the Axis "Areas of Employing Cloud Computing in the Learning Process" reached (0.821), a high coefficient indicating a good level of reliability and internal consistency among the items of this Axis. The reliability coefficient for the "Importance of Employing Cloud Computing in the Learning Process" reached (0.832), indicating a good degree of internal consistency. Meanwhile, the reliability coefficient for the "Challenges of Employing Cloud Computing in the Learning Process" reached (0.841), reflecting an appropriate and high internal consistency among its items, which indicates that the scale possesses a high degree of reliability and internal coherence.

Regarding the validity index—calculated as the square root of the *Cronbach's Alpha* coefficient multiplied by (100)—it reached (90.61%) for the "Areas of Employment" Axis, a high percentage indicating a high degree of validity. The validity percentage for the "Importance of Employment" Axis was (91.21%), which is statistically high and acceptable. Finally, the validity percentage for the "Challenges of Employment" Axis reached (91.71%), a high percentage reflecting a solid level of validity.

Accordingly, the validity and reliability of the study scale have been confirmed, providing confidence in the scale's accuracy and its suitability for analyzing the results and answering the study questions.

Second: Analysis of Personal Data

1) Gender:

Table (3): Frequency Distribution of Respondents by Gender

Gender	Count	Percentage %
Male	42	50.0%
Female	42	50.0%
Total	84	100%

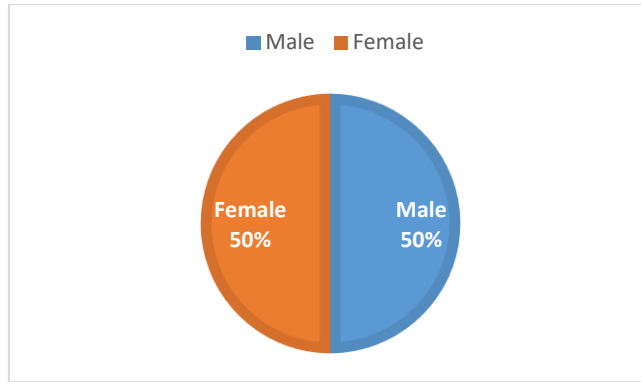


Figure (1) illustrates the percentages of the study population members according to the gender of the respondents.

It is evident from Table No. (3) and Figure No. (1) that the highest percentage of the study sample members by gender was equal between the male and female categories, reaching 50.0% for each.

2) Specialization: Table No. (4) and Figure No. (2) show the distribution of the study sample items according to specialization.

Table (4) shows the frequency distribution according to specialization.

Specialization	Count	Percentage %
General	55	65.5%
Management	9	10.7%
Accounting	20	23.8%

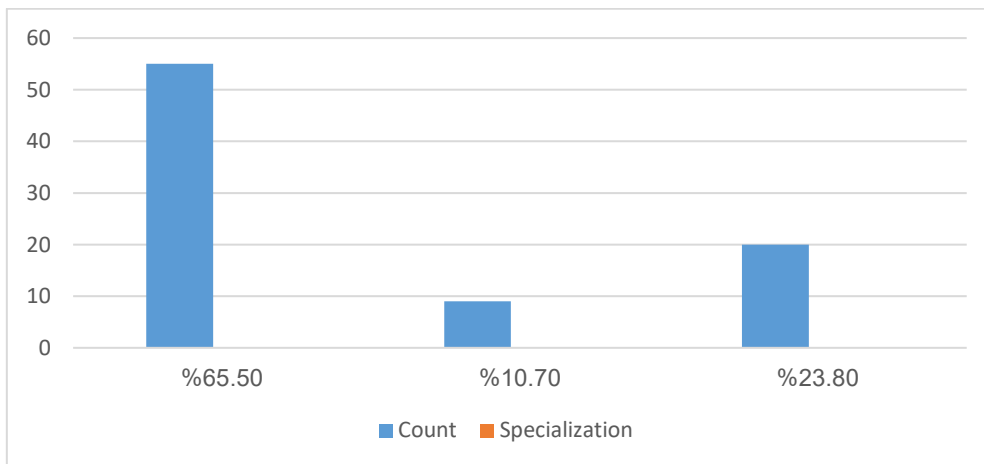


Figure. (2) illustrates the percentages of the study population items according to years of specialization.

Table No. (4) and Figure No. (2) indicate that the highest percentage of the study sample, according to specialization, was in the General category, representing 65.5% of the sample. This was followed by accounting with 23.8%, while the lowest percentage was in Management, which accounted for 10.7%.

3) Age:

Table. (5) and Figure No. (3) show the distribution of the study sample members according to age.

Age	Count	Percentage
From 18 to 20	61	72.6%
From 20 to 22	17	20.2%

From 22 to 24	6	7.1%
Total	84	100.0%

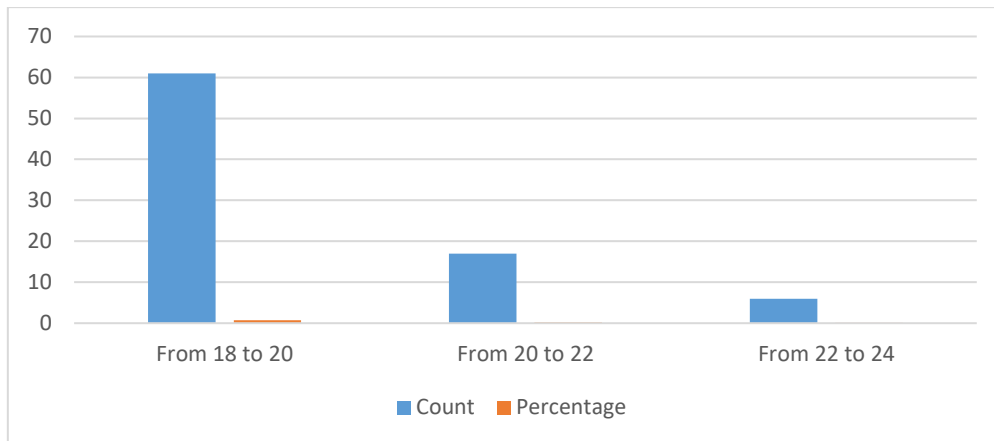


Figure. (3) illustrates the percentages of the study population members by age.

It is evident from Table No. (5) and Figure No. (3) that the highest percentage of the study sample members by age belongs to the "18 to 20 years" category, reaching 72.6%. This is followed by the "20 to 22 years" category at 20.2%, while the lowest percentage was for the "22 to 24 years" category, which reached 7.1%.

Answers to the Study Questions:

Scale Scoring: To achieve the objectives of the study and analyze the collected data, the researcher used a numerical method to code the responses based on a five-point Likert scale, as shown in Table (6):

Table (6): Distribution of Scores for Scale Responses

Response	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Score	1	2	3	4	5

The arithmetic mean (weighted average) is then calculated to determine the weights of the items based on the values obtained from the response analysis after coding and entering the data into the computer. To determine the length of the cells for the five-point scale (the lower and upper limits) used in the study's Axis, the range was calculated ($5 - 1 = 4$) and then divided by the number of scale levels ($4 \div 5 = 0.80$). This value represents the length of a single category or level. Accordingly, the weights are defined as shown in the following weighted average table:

Table No. (7): Weighted Average Obtained from the Analysis of Responses

	Very Low	Low	Moderate	High	Very High
Weighted Average	From 1 to less than 1.80	From 1.80 to less than 2.60	From 2.60 to less than 3.40	From 3.40 to less than 4.20	From 4.20 to 5

Question One: What are the areas of employing cloud computing in the educational process for higher education students?

To answer this question regarding the degree of agreement, we will present the arithmetic mean, standard deviation, relative weight for each item, and its importance for each paragraph. The items are ranked in descending order based on the agreement means in the following table:

Table. (8): Mean and Relative Weight of the Study Sample's Responses

No.	Statement	Mean	Standard Deviation	Relative Weight	Rank	Approval
1	I use cloud storage services (e.g., Google Drive, OneDrive) to store and share course files.	3.55	1.1863	70.95%	3	High
2	I use cloud office applications (e.g., Google Docs, Office 365) to prepare assignments and research.	3.10	1.2765	61.90%	6	Medium
3	I store my personal information and files on social media sites.	3.62	1.2213	72.38%	2	High
4	I primarily use university cloud email for academic communication.	2.40	0.8659	48.10%	7	Low
5	I use cloud meeting and visual lecture applications (e.g., Zoom, Google Meet) when necessary.	3.11	1.2323	62.14%	5	Medium
6	I use cloud computing applications for group work on a single file with my colleagues at the same time.	3.24	1.2381	64.76%	4	Medium
7	Using cloud computing helped me access educational materials easily from anywhere.	3.99	0.7197	79.76%	1	High
Total Average		3.29	0.5172	65.71%	-	Medium

It is evident from Table No. (8) that the degree of agreement on the items of this Axis as a whole was moderate, with an overall arithmetic mean of 3.29, a standard deviation of 0.5172, and a relative weight of 65.71%. The items were ranked in descending order based on the agreement of the study sample members as follows:

1. **Statement No. (7):** "Using cloud computing helped me access educational materials easily from anywhere" ranked first with a high degree of agreement (Mean = 3.99, SD = 0.7197, Relative Weight = 79.76%).
2. **Statement No. (3):** "I store my personal information and files on social media sites" ranked second with a high degree of agreement (Mean = 3.62, SD = 1.2213, Relative Weight = 72.38%).
3. **Statement No. (1):** "I use cloud storage services (e.g., Google Drive, OneDrive) to store and share course files" ranked third with a high degree of agreement (Mean = 3.55, SD = 1.1863, Relative Weight = 70.95%).
4. **Statement No. (6):** "I use cloud computing applications for group work on a single file with my colleagues at the same time" ranked fourth with a moderate degree of agreement (Mean = 3.24, SD = 1.2381, Relative Weight = 64.76%).

5. **Statement No. (5):** "I use cloud meeting and visual lecture applications (e.g., Zoom, Google Meet) when necessary" ranked fifth with a moderate degree of agreement (Mean = 3.11, SD = 1.2323, Relative Weight = 62.14%).
6. **Statement No. (2):** "I use cloud office applications (e.g., Google Docs, Office 365) to prepare assignments and research" ranked sixth with a moderate degree of agreement (Mean = 3.10, SD = 1.2765, Relative Weight = 61.90%).
7. **Statement No. (4):** "I primarily use university cloud email for academic communication" ranked seventh with a low degree of agreement (Mean = 2.40, SD = 0.8659, Relative Weight = 48.10%).

Question Two: What is the importance of employing cloud computing in the educational process for higher education students?

To answer this question, the arithmetic mean, standard deviation, and relative weight for each item are shown in the following table, ranked in descending order:

Table. (9): Mean and Relative Weight of the Study Sample's Responses (Importance)

No.	Statement	Mean	SD	Relative Weight	Rank	Approval
1	Cloud computing contributed to improving my collaboration with my colleagues on projects and study tasks.	3.86	0.8523	77.14%	3	High
2	Cloud computing provided me with secure backups for my important study files.	3.37	1.1697	67.38%	4	Medium
3	I believe using cloud computing has developed my personal digital skills.	3.92	0.8097	78.33%	2	High
4	I consider cloud computing applications necessary to successfully pursue my university education.	3.96	0.6845	79.29%	1	High
Total Overall Average		3.78	0.4909	75.54%	-	High

According to Table No. (9), the overall degree of agreement was high. Item No. (4) regarding the necessity of cloud applications for academic success ranked first, while Item No. (2) regarding secure backups ranked fourth with a moderate degree of agreement.

Question Three: What are the challenges of employing cloud computing in the educational process for higher education students?

The following table analyzes the items of this Axis ranked by the level of agreement:

Table . (10): Mean and Relative Weight of the Study Sample's Responses

No.	Statement	Mean	SD	Relative Weight	Rank	Approval
1	I face a problem with the quality or speed of the internet connection, which hinders the use of cloud applications.	3.52	1.0352	70.48%	5	High
2	I lack sufficient knowledge or appropriate training to use some cloud computing applications effectively.	3.99	0.7683	79.76%	2	High

3	I have concerns regarding the security and privacy of my data and files when using cloud storage.	3.95	0.7901	79.05%	3	High
4	I find it difficult to provide the appropriate computer or smart devices to fully benefit from cloud services.	3.87	0.7244	77.38%	4	High
5	I believe that the cost of some paid cloud services acts as a barrier to using them.	4.01	0.7683	80.24%	1	High
Total Overall Average		3.87	0.4693	77.38%	-	High

It is evident from Table No. (10) that the degree of agreement on the items of this Axis as a whole was high, with an overall arithmetic mean of 3.87, a standard deviation of 0.4693, and a relative weight of 77.38%. The items were ranked in descending order based on the agreement of the study sample members as follows:

1. **Statement No. (5):** "I believe that the cost of some paid cloud services acts as a barrier to using them" ranked first in terms of agreement among the study sample members with a high degree of agreement; the arithmetic mean reached 4.01, the standard deviation was 0.7683, and the relative weight was 80.24%.
2. **Statement No. (2):** "I lack sufficient knowledge or appropriate training to use some cloud computing applications effectively" ranked second in terms of agreement with a high degree of agreement; the arithmetic mean reached 3.99, the standard deviation was 0.7683, and the relative weight was 79.76%.
3. **Statement No. (3):** "I have concerns regarding the security and privacy of my data and files when using cloud storage" ranked third in terms of agreement with a high degree of agreement; the arithmetic mean reached 3.95, the standard deviation was 0.7901, and the relative weight was 79.05%.
4. **Statement No. (4):** "I find it difficult to provide the appropriate computer or smart devices to fully benefit from cloud services" ranked fourth in terms of agreement with a high degree of agreement; the arithmetic mean reached 3.87, the standard deviation was 0.7244, and the relative weight was 77.38%.
5. **Statement No. (1):** "I face a problem with the quality or speed of the internet connection, which hinders the use of cloud applications" ranked fifth in terms of agreement with a high degree of agreement; the arithmetic mean reached 3.52, the standard deviation was 1.0352, and the relative weight was 70.48%.

Results:

1. The results showed that the level of employment of cloud computing in the educational process among higher education students was moderate (Mean = 3.29, Relative Weight = 65.71%). The item "Using cloud computing helped me access educational materials easily from anywhere" received the highest response, followed by "I store my personal information and files on social media."
2. The results showed that the perceived importance of employing cloud computing in the educational process among higher education students was high (Mean = 3.78, Relative Weight = 75.54%). The item "I consider cloud computing applications necessary to successfully pursue my university education" received the highest response, followed by "I see that using cloud computing has developed my personal digital skills."
3. The results showed that the level of challenges in employing cloud computing in the educational process among higher education students was high (Mean = 3.87, Relative Weight = 77.38%). The item "I believe that the cost of some paid cloud services acts as a barrier to using them" received the highest response, followed by "I lack sufficient knowledge or appropriate training to use some cloud computing applications effectively."

Recommendations:

1. Implement practical training programs within the Higher Institute of Science and Technology in Kikla targeting students, focusing on developing skills in using cloud computing applications to contribute to raising the level of actual usage in educational activities, given the low level of usage compared to its high importance.
2. Incorporate cloud computing applications into the Institute's curricula and academic assignments by utilizing them in preparing homework, teamwork, and sharing educational resources, which enhances the transition from limited use to effective use within the educational environment.
3. Enhance the technical infrastructure at the Institute, especially regarding internet speed and quality, and provide appropriate devices, which will contribute to reducing the challenges shown by the results related to connection difficulties and poor technical capabilities.
4. Offer awareness and training programs for Institute students regarding cloud computing concepts and usage mechanisms to address the lack of knowledge among some students, despite their realization of its importance in the educational process.
5. Develop organizational policies within the Institute that encourage the use of cloud computing in the educational process and support its systematic adoption by faculty members and students, contributing to promoting its sustainable use.
6. Support students by providing free or institutional alternatives for cloud computing applications, which reduces the impact of cost as one of the challenges shown by the study results.

References

- [1] Hayam Hayek. (2013). *Cloud computing invades higher education institutions*. Retrieved from. <https://blog.naseej.com/2013/03/02/%D8%A7%D9%84%D8%AD%D9%88%D8%B3%D8%A8%D8%A9-%D8%A7%D9%84%D8%B3%D8%AD%D8%A7%D8%A8%D9%8A%D8%A9-%D8%AA%D8%BA%D8%B2%D9%88-%D9%85%D8%A4%D8%B3%D8%B3%D8%A7%D8%AA-%D8%A7%D9%84%D8%AA%D8%B9%D9%84%D9%8A%D9%85>
- [2] Khalid bin Nasser Al-Hayyan. (2019). *Cloud computing: Fundamentals, principles, and applications* (1st ed.). Institute of Public Administration, Research and Studies Center, Riyadh, Saudi Arabia.
- [3] Amin Ben Said, Ahmed Mohammed Makhlof, & Nadia Abdulrahim. (2019). Cloud computing: The future of electronic business transformation. *Al-Mithqal Journal for Economic and Administrative Sciences*, 5(Special Issue), 61–80. Amman, Jordan.
- [4] Alaa Jaber. (2019, June 14). *The concept of the educational process and its elements*. Mawdoo3. Retrieved from. https://mawdoo3.com/%D9%85%D9%81%D9%87%D9%88%D9%85_%D8%A7%D9%84%D8%B9%D9%85%D9%84%D9%8A%D8%A9_%D8%A7%D9%84%D8%AA%D8%B9%D9%84%D9%8A%D9%85%D9%8A%D8%A9_%D9%88%D8%B9%D9%86%D8%A7%D8%B5%D8%B1%D9%87%D8%A7
- [5] Higher Institute of Science and Technology Kikla. (2023). *Higher Institute of Science and Technology Kikla*. Retrieved November 29, 2023, from <https://www.facebook.com/profile.php?id=100064689159274>
- [6] Yahya Abdulrazzaq Qatran. (2019). Yemeni university students' use of cloud computing in education and their attitudes toward it. *Abhath Journal*, 1(16).
- [7] Lama Ababtain & Ahmed Al-Dreweesh. (2021). Reality of using cloud computing in education for students of Shaqra University. *Journal of Educational and Qualitative Research*, 4, 215–243. <https://doi.org/10.21608/jeor.2021.147322>

- [8] Farid Amer. (2023). The reality of using cloud computing applications and services among students and faculty members at the College of Oil and Minerals. *Shabwa University Journal of Humanities and Applied Sciences*, 1(1), 190–209.
- [9] Wang, L.-Y.-K. (2024). Evaluating the impact of cloud e-learning in higher education: An empirical investigation. *Knowledge Management and E-Learning*, 16(2), 286–308.
<https://doi.org/10.34105/j.kmel.2024.16.014>
- [10] Hurwitz, J., Bloor, R., Kaufman, M., & Halper, F. (2010). *Cloud computing for dummies*, Indiana. Wiley Publishing.
- [11] Vennam, S. (2020). *Cloud computing*. IBM Cloud Learn Hub. Retrieved April 1, 2026, from <https://www.ibm.com/cloud/learn/cloudcomputing>
- [12] Kapil, D., Tyagi, P., Kumar, S., & Tamta, V. P. (2017). Cloud computing: Overview and research issues. In *International Conference on Green Informatics (ICGI 2017)*.
- [13] Al-Mutairi, A. B. S. (2018). Cloud computing: Concept, applications, and benefits. *Journal of the Faculty of Arts, Sohag University*, (47, Part 2).
- [14] Modisane, P., & Jokonya, O. (2021). Evaluating the benefits of cloud computing in small, medium and micro-sized enterprises (SMMEs). *Procedia Computer Science*, 181, 784–792.
- [15] Zouhri, M., & Rehali, B. (2016). Cloud computing or on-demand computing: Issues and perspectives. *Revue Marocaine de Gestion et d'Economie*, 3(7), 1–16.
- [16] Vall, M. (2017). *Grid and cloud computing*. Pan African Virtual University, Nairobi, Kenya.
- [17] Al-Mubarak, R. (2021). *The use of cloud computing applications in the educational process*. University of Algiers. *Al-Mohtarif Journal of Sports Sciences and Human and Social Sciences*, 8(4), 20–49.
- [18] Khafaji, M. (2022). *Best cloud storage applications for Android systems*. Arab Hardware. <https://arabhardware.net/articles/best-cloud-storage-apps-for-android>
- [19] Nagar, T. (2023, April 17). *Benefits and features of cloud computing in education industry*. DEV TECHN SYS. Retrieved from, <https://devtechnosys.com/insights/cloud-computing-in-education/>
- [20] Harisson, J. (2023, November 10). *The main benefits & challenges of cloud computing in education*. iTcompanies. Retrieved from, <https://itcompanies.net/blog/cloud-computing-in-education>
- [21] Ma, C. (2021, April 2). *5 benefits, 5 challenges of cloud computing in higher education*. UB University Business. Retrieved from, <https://universitybusiness.com/5-benefits-5-challenges-of-cloud-computing-in-higher-education/>
- [22] Hayek, H. (2021, August 2). *Cloud computing in higher education: Opportunities and challenges*. Naseej Academy. Retrieved from, <https://blog.naseej.com/>
- [23] Al-Bayati, M. M. (2005). *Statistical data analysis using SPSS*. Dar Al-Hamid for Publishing and Distribution, Amman.

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