

Digital Ethical Values Awareness among Education Students at the University of Nizwa: Science and Information Technology Majors

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Abstract

This study examined the level of awareness of digital ethical values among female education students at the University of Nizwa majoring in Science and Information Technology, and situated their awareness within the university's institutional framework and regulations. A mixed-methods approach was employed. Quantitatively, a questionnaire was administered to a sample of 109 students (32 Science majors and 77 Information Technology majors). Qualitatively, a content analysis was conducted of three official university documents related to life-skills awareness, e-learning regulations, and electronic examinations, in order to support and interpret the quantitative findings in light of approved institutional practice. To address the research questions, a questionnaire was developed comprising three dimensions: respect for rules of use, etiquette of digital communication with others, and intellectual property rights. Validity and reliability were established using appropriate statistical procedures; Cronbach's alpha reached 0.92. The results indicated a very high level of awareness of digital ethical values among the participants. The findings also showed no statistically significant differences at the $\alpha \leq 0.05$ level in awareness of digital ethical values attributable to academic major (Science vs. Information Technology). Situated within educational studies and applied humanities, the study highlights the role of institutional policy and teacher-education programs in shaping students' ethical dispositions in digital environments. It recommends that programs in Science and Information Technology education place further emphasis on developing students' skills in critically evaluating online information and in applying digital ethics in authentic academic and professional contexts.

Keywords: Educational Studies, Science, Information Technology, Digital Ethical Values, University of Nizwa.

1. Introduction

Value awareness is one of the most important components of human personality. It forms a general model of individual behavior in society. As Al-Saadoun (2019) points out, value awareness represents the understanding of moral values through which people's actions are governed. The most prominent of these values is honesty and sincerity; therefore, understanding

values should lead to the obligation to activate these valuable guidelines in the reality of everyday life. This, in turn, helps in increasing the full benefits that connect communities and accept diversity within societies. The reality of technology today requires communities and individuals to interact virtually in all aspects of life because values should not be separated or vary according to the locations and conditions. This interaction in its various forms must be followed by a set of rules that demand those values that are practiced mainly in our daily lives, which the researchers of the present study refer to as digital value awareness. Becker, Nemat, Lucas, Heinitz, Klevesath, and Charton (2023) argue that digital transformation has created ethical challenges beyond traditional legal frameworks, necessitating value-based guidance for technology use. In this context, digital value awareness may be understood as essential for responsible technology use, encompassing an understanding of regulatory norms and ethical implications. Therefore, awareness of digital values may focus on modern concepts derived from general concepts of values, such as respecting privacy and academic integrity, avoiding piracy, spreading false information, and cyberbullying, among similar issues in the digital usage context.

Institutions of higher education (HEI) have a great responsibility in cultivating this value awareness since students who attend HEI are among the most employed members of society with skills in various fields and levels. Also, based on their different specializations, universities can raise the awareness of students in aspects of digital values through lectures and courses. These methods not only raise students' digital awareness but also contribute to training them to take responsibility and play a role in raising awareness for others.

Although the previous discussion was about HEIs in general, teacher training institutions bear greater responsibility in ensuring that students adopt these values, so that a good teacher can effectively influence their students. In this regard, Al-Buqami (2022) points out that digital ethics must be integrated into curricula to help in addressing digital challenges. Therefore, increasing the awareness of student teachers regarding digital values significantly contributes to the rapid spread of this awareness among the next generation. The Arab-Islamic society is endowed with a rich heritage of ethical values that greatly aid in emphasizing the importance of values that align with the modern needs of digital value awareness. Islam, in many instances, has urged honesty, the preservation of rights, and the prohibition of violating others. Islamic principles provide a model for humanity that should be utilized to strengthen digital awareness (Abdullah et al., 2021).

However, the discussion of what should be done in this regard shows that the application of digital value awareness faces significant challenges. This is evident in various issues, such as the rapid spread of rumors, fabricated videos and images, and the increasing emergence of applications and updates in technical fields. This makes it difficult to keep up with them through organized and comprehensive legal frameworks that require international agreements. Additionally, tracking down violators and those causing harm to others is not an easy task, especially if they are outside the country. Hence, despite the various forms of confrontation, the methodology of awareness must be based on well-established ethical and value systems that protect societies and individuals from upcoming harm by enhancing the capacities that provide personal and collective protection.

Raising awareness of digital values in teacher training institutions is not limited to technology specialties; it is the responsibility of everyone interested in using technology, as it is an essential component of education based on digital communication. Several studies agree on the importance of digital awareness and have used different research designs and instruments. For example, Li (2024) explored digital ethics, social responsibility, and data security awareness

among university students in China by comparing first-year and fifth-year cohorts. The study adopted a quantitative descriptive comparative design and collected data through a questionnaire administered to (400) students. The results indicated that senior students showed higher levels of digital ethics, suggesting that greater academic experience may help strengthen students' digital ethical awareness. Another study by Gray (2023) aimed to describe and analyze the strategy of involving the university community in ethical issues and educational technology through the Digital Detox project at Thomson Rivers University (TRU). The study involved (200) students and followed an analytical methodology by reviewing literature, hosting live sessions, and providing educational materials via email and the website. The findings indicated the project increased understanding of ethical issues related to technology among students. Additionally, live discussions provided valuable insights into using technological tools more ethically.

Locally, Shehata et al. (2023) evaluated the ethical competencies of Omani students in the Information Studies major during e-learning amid the COVID-19 pandemic. This quantitative descriptive study used a questionnaire to assess the competencies of 93 students, with males representing (44.1%) and females (55.9%). The study found students lack essential ethical competencies for e-learning, highlighting unethical practices such as cheating, plagiarism, copying, and uncredited citation. It also showed that both genders share a similar level of awareness of these practices. Okoye et al. (2023) aimed to explore the impact of digital technology on teaching and learning in HEIs in Latin America. The study followed a mixed-method approach and distributed a questionnaire to (1,576) teaching staff across HEIs in nine countries. Findings showed a lack of training and infrastructure, with disparities—Peru suffering more from limited resources compared to Colombia and Mexico. In addition, Piragauta & de Oliveira. (2023) investigated moral experience in virtual learning environments from the perspectives of university students and teachers. Using an analytical descriptive method, they surveyed (205) students and (30) teachers from universities in Colombia, Mexico, and Spain. Results showed key values considered important include commitment, responsibility, respect, integrity, discipline, and solidarity. Also, teachers view behavior rules in virtual settings as part of their responsibilities. Additionally, differences emerged in value perceptions, for example, 76% of students valued understanding compared to 36.6% of teachers.

Al-Buqami (2022) determined the degree of awareness of digital ethical values among Al-Taif University students from their point of view. The study aimed to present mechanisms to promote these values. It followed the analytical descriptive research design with (476) students and used a questionnaire to measure awareness levels. The results indicated high awareness among students. Additionally, there were no statistically significant differences attributable to gender. However, statistically significant differences existed based on educational qualifications favoring those holding a bachelor's degree. Moreover, Al-Otaibi (2022) identified digital citizenship values among university youth in Riyadh. The study employed questionnaires and interviews to collect data from (392) students at Imam Muhammad bin Saud Islamic University. The findings showed students understand and practice digital citizenship positively. Although some female students experienced unethical situations such as cyberbullying and fraud, students had good awareness of digital citizenship practices. Also, Abdulhalim, Hazin, Abdelwahab & Masoud (2021) investigated an educational program based on digital sources to develop ethical values among History Department students at the College of Education. Using a descriptive-analytical design, the sample included 30 third-year students. Ethical scenarios test measured values before and after the program. The findings showed that the program effectively developed ethical values. While

Abolbhan (2021) examined the level of digital ethics among students at the Faculty of Specific Education, Damietta University, following the COVID-19 pandemic from their perspective, a descriptive-analytical approach was adopted, and a questionnaire was administered to (481) male and female students from the third and fourth academic years. The findings revealed a high level of positive perceptions toward digital ethics practices, particularly in digital safety, followed by privacy and accuracy, whereas intellectual property rights ranked last. No statistically significant differences were found based on gender, while significant differences were observed according to academic specialization and academic level.

Furthermore, Al-Buqami (2021) explored the ethics of image use on social media from Saudi university youth's perspective. The study used a descriptive-analytical design and surveyed (200) students from Umm Al-Qura University. Results indicated a high level of awareness regarding image-posting ethics. There were no statistically significant gender differences, but significant differences appeared among academic disciplines. Additionally, Likewise, Rifai (2021) aimed to recognize digital citizenship's impact on changing values in Egyptian society and identify weaknesses. Using a descriptive-analytical design, data were collected via an electronic questionnaire from (370) students and faculty at Alexandria University. Findings highlighted changes in moral and social values due to technology and social media and revealed deficiencies in digital citizenship and its negative effects. Also, Trybulkevych et al. (2021) explored how teachers' ongoing efforts impact their digital personal reputation. The study focused on communication ethics using interviews and questionnaires from (73) public school teachers in Ukraine. Results showed (63%) believe communication ethics are essential for building personal reputation and ongoing efforts improved skills in ethical communication. Based on the studies presented above, there are some comparisons with the current study in some respects. First, the current study is like previous studies in employing a descriptive research design, except for one study, that by Abdulhalim et al. (2021), which followed a quasi-experimental research design. Most of the previous studies used a questionnaire to collect data except for studies like Gray (2023). The current study is also like the previous studies in addressing the awareness of digital values. Additionally, the current study and previous studies share the use of students as the sample. Second, this study differs from previous studies in terms of the targeted sample as it focuses on the awareness of digital values from the perspectives of the university students. The only study that addressed the same sample was the study of Al-Buqami (2022). Third, this study is unique because it focused on education students majoring in science and information technology at the University of Nizwa in Oman. The current study benefited from previous research in defining the dimensions of digital values and ethics and in adopting appropriate methods and measurement tools. It also used prior findings to interpret the results and identify the research gap concerning university students' awareness in the Omani context.

2. Problem Statement and Research Questions

Digital ethics are crucial in guiding technology use, particularly in higher education institutions, given their role in regulating responsible digital educational practices. Through direct interaction with the university environment, researchers have observed a clear disparity in students' approaches to digital technologies, with this use not always aligning with assumed ethical principles.

Comparing these field observations with educational literature, especially the findings of Al-Buqami (2022) and Al-Otaibi (2022), which emphasize the need to raise awareness of digital

values among this group, reveals a gap between theoretical conceptions of digital values and their implementation in educational practice. This discrepancy reveals a research problem that requires study and analysis. Therefore, the researchers identified the need to examine the actual level of students' awareness of digital ethical values. This study was conducted to examine the level of awareness of digital ethical values among education students at the University of Nizwa in the science and information technology disciplines. The disciplines were chosen because they are the researchers' disciplines and represent the largest proportion of students enrolled in education programs at the university. Moreover, this study seeks to contribute to the literature on digital ethical values and to establish a foundation for future research grounded in students' actual levels of awareness of digital values.

2.1 Study Questions

The study attempted to answer the following research questions:

1. What is the level of awareness of digital ethical values among education students at the University of Nizwa (Information Technology and Science) from their perspective?
2. Are there statistically significant differences at the significance level ($\alpha \leq 0.05$) in the level of awareness of digital ethical values among the study sample attributed to the variable of academic major?

3. Study Objectives

This study aimed to achieve the following objectives:

1. To determine the level of awareness of digital ethical values among education students majoring in Information Technology and Science from their perspective.
2. To identify the differences between Information Technology and Science students in their level of awareness of digital ethical values.

4. Study Significance

The significance of this study can be explained in two areas: scientific and theoretical significance, as follows:

The scientific significance of this study lies in its contribution to providing specialists at the university with key areas where students need to enhance their digital values. This can aid in developing the types of programs offered to them, especially in the technical and scientific fields. Additionally, the study will draw the attention of curriculum specialists to the importance of incorporating awareness aspects regarding digital values when designing or revising the curriculum.

One aspect of the theoretical significance of this study is its alignment with the educational role and its implications for future generations, since the sample comprises students from the fields of Science and Information Technology majors that engage directly and intensively with technology. These students will be at the forefront of influencing their future teaching roles. Therefore, their deep theoretical awareness of digital ethical values will facilitate community efforts and save considerable effort in educating future generations. Furthermore, the fields of Science and Technology are the closest to technological innovation in the future. Additionally, the study may provide theoretical material from the literature review that could enrich any subsequent intellectual output or future research on the same topic.

5. Study Terminology

Digital Ethical Values

Hanna and Kazim (2023) define digital ethical values as “the principles and ethical standards that guide human behavior in the context of digital technology and artificial intelligence” (p. 40). Operationally, researchers define it as a set of principles and ethical standards that guide university students' behavior in the responsible use of digital technology and artificial intelligence.

Awareness

Webb and Graziano (2015) define awareness as “the conscious perception of internal or external events or experiences. It is the state in which stimuli are recognized and responded to in a manner that indicates the individual's awareness of them” (p. 1). Operationally, researchers define it as university students' awareness of the digital influences on their behavior and their responses to regulations and alerts regarding the consequences of irresponsible interactions with technology.

Education Students

Brown (2005) defines education students as “teacher candidates in educational institutions that prepare teachers to obtain educational qualifications, providing them with teaching experiences and skills under the supervision and guidance of specialists from these institutions” (p. 139). Operationally, researchers define them as the students enrolled in the Department of Education at the University of Nizwa who are studying the fields of science and information technology and who are trained to understand and apply educational curricula and to develop their skills.

Study Limitations

The study is limited to several boundaries. Firstly, the subject limitations reflect the level of awareness of students regarding digital ethical values by analyzing this topic from aspects such as respect for usage rules, communication etiquette with others, and intellectual property rights. Secondly, the human limitations reflect the fact that the sample was restricted to (109) female education students at the University of Nizwa, majoring in Science and Information Technology. Thirdly, the spatial limitations indicate that the study was conducted at the University of Nizwa in Oman; therefore, the results reflect the level of awareness of digital values only within this university. Finally, the time limitations state that the study was conducted in the spring of (2024) and was completed specifically in May (2024).

6. Methodology

6.1 Research design

The study employed a mixed-methods approach as it is appropriate for its objectives and research questions. The quantitative aspect was represented in the application of a questionnaire to measure the degree of awareness of digital ethical values among education students, which helps in reaching results that reflect reality. The qualitative aspect was represented in the content analysis of three official documents used at the University of Nizwa, related to awareness of life skills, regulations of e-learning, and e-examinations, to support and interpret the quantitative results within the framework of established institutional practice.

6.2 Population and Sample

The study population comprised all student-teachers majoring in Science and Information Technology within the Education Department. The total was (614) students: (391) students in the Information Technology major and (223) students in the Science major.

The sample consisted of (109) female students; (32) were from the Science major and (77) were from the Information Technology major, as shown in Table (1).

Table (1): Distribution of Study Sample by Variables

No.	Category	Population	Population Percentage	Sample	Sample Percentage
1	Science Major	223	36%	32	30%
2	Information Technology Major	391	64%	77	70%
	Total	614	100%	109	100%

6.3 Analyzed Documents

Three official documents implemented at the University of Nizwa and related to digital ethical values were analyzed. These documents were chosen because they represent official sources that guide students' behavior in the digital environment, namely:

1. Document of "Life Skills and University Learning" (Foundation Institute, 2018), offered as a course for foundation program students at the University of Nizwa
2. Document of "Guidelines for E-learning" (University of Nizwa, 2021).
3. Document of "Guidelines for Online Final Examination for Students" (University of Nizwa, 2020).

6.4 Instrument

To achieve the objectives of the study, the researchers developed the study instrument by reviewing the literature such as Al-Buqami (2022) and Abu Zaid et al. (2024). The initial version of the questionnaire consisted of 24 items divided into three dimensions. The questionnaire adopted A five-point Likert scale (5 = Very High, 4 = High, 3 = Moderate, 2 = Low, 1 = Very Low).

6.5 Validity and Reliability

The questionnaire was presented in its initial form to a panel of seven experts specialized in curriculum and teaching methods, educational technology, and psychology from various institutions (Nizwa University, Al Sharqiyah University, and the Ministry of Education) in order to ensure its face validity. The researchers modified the instrument based on feedback from the experts.

Then, the questionnaire was piloted with a sample of (20) student-teachers from Nizwa University, majoring in Science and Information Technology, to verify its construct validity. The researchers analyzed the items of the instrument and calculated the correlation coefficients for each item. These results of the correlation coefficients indicate the validity of each item in relation to the total score and its respective dimension. Table (2) presents these details.

Table (2): Pearson Correlation Coefficients for Questionnaire Items with their Dimension and Total Instrument Score

Respect for Usage Rules			Communication Etiquette			Intellectual Property		
NO.	Correlation Coefficient with the Dimension	Correlation Coefficient with the Overall Score	NO.	Correlation Coefficient with the Dimension	Correlation Coefficient with the Overall Score	NO.	Correlation Coefficient with the Dimension	Correlation Coefficient with the Overall Score
1	0.575**	0.513*	1	0.582**	0.515**	1	0.732**	0.658**
2	0.557**	0.447*	2	0.579**	0.613**	2	0.868**	0.813**
3	0.611**	0.461*	3	0.709**	0.715**	3	0.866**	0.824**
4	0.611**	0.461*	4	0.759**	0.587**	4	0.946**	0.875**
5	0.528**	4.31*	5	0.689**	0.758**	5	0.805**	0.809**
6	0.532**	0.520*	6	0.845**	0.878**	6	0.863**	0.881**
7	0.522**	0.495**	7	0.580**	0.606**	7	0.828**	0.826**
8	0.663**	0.16*	8	0.821**	0.814**	8	0.805**	0.762**

*Significant at $\alpha=0.05$

**Significant at $\alpha=0.01$

Table (2) shows that all the correlation coefficients were statistically significant and within acceptable levels. Therefore, none of the items were removed. To verify the internal construct validity of the study tool and its dimension, the researchers calculated correlation coefficients between the study dimension and the overall tool, as well as between the different dimensions of the study tool as illustrated in Table (3).

Table (3): Values of the Intercorrelation Coefficients among the Dimensions and with the Overall Score of the Questionnaire.

Dimension	Respecting Usage Laws	Communication Ethics	Intellectual Property
Communication Ethics	0.60**		
Intellectual Property	0.53**	0.86**	
Overall	0.69**	0.95**	0.96**

**Statistical significance at $\alpha = 0.01$ level.

Table (3) shows that all the correlation coefficients were statistically significant and acceptable, which indicates a satisfactory level of construct validity.

To ensure the reliability of the questionnaire, the researchers calculated the internal consistency coefficient using Cronbach's alpha formula. Table (4) shows the internal consistency coefficients according to Cronbach's alpha for the overall questionnaire.

Table (4): Values of the Reliability Coefficients for the Dimension and the Overall Reliability Coefficient of the Questionnaire Using Cronbach's Alpha.

Dimension	Cronbach's Alpha Coefficient	Number of Items
Respecting Usage Rules	0.70	8
Communication Etiquette	0.76	8
Intellectual Property	0.93	8
Overall Score	0.92	24

6.6 Procedures

The researchers identified the research problem and questions, reviewed the educational literature related to the study topic, and prepared the study tool while ensuring its validity and reliability. Then, they extracted data and did the statistical entry and analysis. Additionally, a content analysis of three official university documents was conducted to support the survey findings. They analyzed and discussed the results. Finally, they wrote the recommendations and suggestions.

7. Results and Discussion

Results of Research Question 1

To answer the first question, which states What is the level of awareness of digital ethical values among education students at the University of Nizwa (Information Technology and Science) from their perspective? the means and standard deviations for the entire tool and for the individual dimension were calculated as shown in Table (5).

Table (5): Means and Standard Deviations of All Dimension Ordered in Descending Order

No.	Dimension	M	S.D.	Judgment
1	Respect for Usage Rules	4.67	0.40	Very High
2	Communication Etiquette with Others	4.20	0.62	High
3	Intellectual Property Rights	4.20	0.44	High
Overall		4.36	0.43	Very High

It can be observed from Table (5) that the dimension respect for usage rules scored a mean of (4.67) with a standard deviation of (0.40), which indicates a very high level. The dimension communication etiquette with others scored a mean of (4.20) with a standard deviation of (0.62) which indicates a high level. Similarly, the dimension intellectual property rights also scored a mean of (4.20) with a standard deviation of (0.44), which indicates a high level. The overall mean for the survey was (4.36) with a standard deviation of (0.43), which indicates a very high level. The distinction of Respect for Usage Rules dimension can be attributed to the clarity and repetition of users' guidelines across the platforms frequently used by student teachers which foster compliance with these rules. The researchers calculated the means and standard deviations for each statement within each dimension to gain a deeper understanding of the questionnaire's dimensions as shown in the following tables (6), (7) and (8).

This result is consistent with the findings of Al-Buqami (2022), who reported a high level of digital value awareness among university students. However, this finding contrasts with the results reported by Shehata et al. (2023), which indicated that students lacked essential ethical competencies required for effective e-learning.

To provide a deeper interpretation of this result, three official documents implemented at the University of Nizwa and related to the context of digital ethical awareness were analyzed. The content analysis showed that the high level of awareness demonstrated by the study is consistent with what is stated in these documents, as follows:

First: The result aligns with the content of the document "Life Skills and University Learning" (Foundation Institute, 2018), The content analysis of this document revealed a clear focus on the necessity of adhering to ethical and religious standards in the digital world; multiple references were made to "the red lines drawn for us by our noble religion, customs, and

traditions" when using technology, which helps to enhance this awareness among students from their early academic stages.

Second: This high level of awareness corresponds with what is stated in the document "Guidelines for E-Learning" (University of Nizwa, Spring 2021), which represents the official framework regulating student behavior in the digital space. The analysis showed a clear institutional focus on the importance of adhering to digital policies and ethics, with multiple references to policies such as "Student Academic Misconduct Policy," "Attendance and Absence Policy," and "Student Assessment Policy."

Third: The result also agrees with what is stated in the document "Guidelines for Online Final Examination for Students" (University of Nizwa, 2020). This document emphasizes the necessity of students' familiarity with academic policies and guidelines. The document, for example, states that "the online final exam is recorded and can be used for auditing purposes," which reinforces students' awareness that their digital behavior is subject to institutional accountability and documentation. This clear regulatory framework contributes to establishing a digital ethical culture among students, which explains their generally high level of awareness.

This integration of different dimensions within a single document explains the high levels of awareness demonstrated by the survey results, as students are regularly exposed to these guidelines through their daily practices in the university's digital environment.

Each domain of the questionnaire will be studied later, and its results will be linked to the analysis of each of the aforementioned documents.

Table (6): Means and Standard Deviations for the Statements in the Respect for Usage Rules Dimension, Ranked in Descending Order

Statement	M	SD	Judgment
I feel Allah's presence watching over me in both private and public when dealing with technology	4.84	0.41	Very High
I avoid watching inappropriate content and websites	4.83	0.45	Very High
I use proper language and polite expressions during virtual communication	4.76	0.52	Very High
I am careful when dealing with commercial websites while making online purchases	4.71	0.60	Very High
I avoid the negative use of information technology	4.69	0.62	Very High
I obtain prior approval when I need to use others' data	4.63	0.58	Very High
Before sharing or exchanging any information on social media, I verify its accuracy and acceptability	4.54	0.65	Very High
I am aware of the rules for using virtual classrooms such as Google Meet, Teams, Zoom	4.34	0.73	Very High
Overall	4.67	0.40	Very High

Table (6) shows that the mean scores for the statements respect for usage rules dimension range between (4.34 - 4.84) with standard deviations between (0.73 - 0.41). All statements are rated at a very high level, which indicates that education students have a very high awareness of

respecting usage rules. This can be attributed to factors such as the awareness programs provided by the university in this area. Additionally, the sample consists of students in Information Technology and Science majors who are frequently exposed to the technological guidelines for the platforms they use.

The prominence of the "respect for usage rules" dimension in the overall averages can be explained by document analysis. Analysis of the content of the "Life Skills and University Learning" document (Foundation Institute, 2018) revealed repeated emphasis on the importance of these rules, including:

- The document contains texts that stress adherence to the rules governing the use of virtual classrooms.
- The document emphasizes the necessity of documenting the sources of academic material to avoid violating the rules, which explains the students' heightened awareness of the importance of citation and respecting the rights of others. This clarity and repetition in an official document read by all students significantly contribute to raising awareness and place this theme at the forefront.
- An analysis of the content of the "Guidelines for E-learning" document (University of Nizwa, 2021) reveals a clear institutional focus on defining the rules governing digital use. This includes:
 - The document is based on "Decision (615/2020) issued by the Ministry of Higher Education, Research and Innovation" (University of Nizwa, 2021, p. 2), giving the regulations a national and official dimension that reinforces student compliance.
 - The document refers to specific policies with reference numbers, such as the Academic Misconduct Regulations and the rules for online final examinations.
 - The document includes rules applicable to faculty members, such as, "The University of Nizwa's e-learning platform is the EduWave and Moodle learning systems, and instructors may not use any other platform without permission from the Information Technology Center" (University of Nizwa, 2021, p. 3), and to students, such as, "Students must be able to use the EduWave system – the university's approved platform for distance learning" (University of Nizwa, 2021, p. 6). This fosters a culture of collective adherence to the rules.
 - The document emphasizes the importance of students being aware of several interconnected policies (academic misconduct, attendance and absence, and assessment), creating a comprehensive framework of rules governing digital behavior.

This institutional clarity and formal documentation of the rules contribute to raising student awareness and motivating them to comply, which explains why this aspect ranked highly in the results.

The high ranking of the "Respect for Usage Rules" axis can also be explained by the binding guidelines governing student digital conduct outlined in the "Guidelines for Online Final Examination for Students" document (University of Nizwa, 2020). This document specifies a set of rules and procedures that students must adhere to, including:

- "Students must log in to the platform fifteen (15) minutes before the exam start time" (University of Nizwa, 2020, p. 2).

- "Students are not permitted to leave the online exam session during the first forty (40) minutes of the exam period" (University of Nizwa, 2020, p. 3).
- The document refers to specific policies such as the Student Academic Misconduct Policy and the Attendance and Absence Policy.

This clarity in defining rules and procedures, and linking them to specific official references, contributes to enhancing students' awareness of the importance of adhering to digital usage rules, which explains why this axis received the highest average score.

Table (7): Means and Standard Deviations for the Statements under the Dimension Etiquette of Communication with Others Ranked in Descending Order

Statement	M	S.D.	Judgment
I respect the privacy and confidentiality of others' information.	4.83	0.39	Very High
I strive to be a model of Islamic values and Arab customs in the digital world.	4.79	0.46	Very High
I do not share my personal information, such as the password to my devices, with others.	4.76	0.60	Very High
I care a lot about knowing the necessary steps to protect individual privacy.	4.49	0.73	Very High
I am aware of the steps to take if I am exposed to any online threats or extortion.	4.37	0.78	Very High
I continuously develop my digital skills to enhance my academic and professional competence.	4.30	0.74	Very High
I manage my time properly when engaging in the virtual world for the sake of my physical and mental health.	4.20	0.85	High
I ensure that any content I resend does not violate morals and etiquette.	4.13	1.34	High

Table (7) shows that the means for the statements under the etiquette of communication with others dimension ranged between (4.13-4.83) with standard deviations between (0.39-1.34). The first six statements were rated as very high. This is likely because the statements focus on privacy and confidentiality on a personal and collective level which emphasize their significance and the greater need for adherence to online etiquette. However, the two statements were rated as high. These statements are "I manage my time properly when engaging in the virtual world for the sake of my physical and mental health" and "I ensure that any content I resend does not violate morals and etiquette". Despite their relatively high rating, their lower ranking compared to other statements explained that time management and communication are skills that require more experience and practice from students.

This finding aligns with the guidelines outlined in the "Life Skills and University Learning" document (Foundation Institute, 2018) regarding communication etiquette. Among the key points emphasized are:

- The document stresses respecting the privacy and confidentiality of others' information and refraining from sharing personal information such as passwords. These values are reflected in the high average number of privacy-related statements in the survey.
- The document warns against forwarding rumors and unverified information without first verifying it. This is a moral responsibility and neglecting it could lead to legal repercussions.

- The document emphasizes the importance of using proper language and polite terms in online communication.
- The document highlights the need for students to embody Islamic values and Arab customs in the digital world.

Analysis of this document reveals that it not only provides technical guidelines but also establishes a digital ethical identity for university students, which positively impacts their adherence to communication etiquette. The results regarding the etiquette of communication with others also aligned with the guidelines outlined in the "Guidelines for E-learning " document (University of Nizwa, 2021), which governs communication mechanisms between students and faculty members. Key among these guidelines is:

- The document stipulates that all academic matters related to students should be addressed only during office hours, from 8:00 AM to 4:00 PM. This promotes respect for personal time and regulates the pace of communication.
- The document directs students to use specific official platforms such as Eduwave Session and Moodle, thus regulating communication mechanisms and protecting everyone's privacy.
- The document emphasizes the importance of direct interaction with instructors using audio-visual tools during lecture time, which reinforces attendance etiquette and virtual interaction.
- The document allows for the use of asynchronous communication as determined by the instructor and at appropriate times, thus regulating communication outside of lecture hours. These clear guidelines foster a disciplined communication culture that respects privacy, appropriate times, and appropriate methods, thereby improving students' adherence to communication etiquette.

Similarly, the "Guidelines for Online Final Examination for Students" document (University of Nizwa, 2020) provides precise guidelines governing student communication in the digital environment, aligning with the outcome. These guidelines include:

- Students must turn on their cameras fifteen (15) minutes before the start of the exam; their faces must be clearly visible to the camera in a well-lit room; students must position their cameras so that their faces are fully visible; and students may not turn off their cameras unless they are instructed to do so.
- Students must unmute their microphones unless permitted by the invigilator, and microphones must be switched off if instructors perceive a noise problem.
- Students must not take photos/screenshots/videos of their classmates and post them on social media or other platforms. This is strictly prohibited and may result in disciplinary action against the offender.

Analysis of this document reveals that it does not merely provide technical instructions but rather establishes a comprehensive digital communication culture that considers behavioral and ethical dimensions. Analysis of the three documents together demonstrates that they form an integrated framework for establishing a digital communication culture among university students.

This integration of value formation, institutional organization, and practical procedures explains the high level of students' awareness of digital communication etiquette.

Table (8): Means and Standard Deviations for the Statements under the Intellectual Property Rights Dimension Ranked in Descending Order

Statement	M	S.D.	Judgment
I am aware of the negative effects of downloading unknown and unverified programs and applications.	4.63	0.59	Very High
I have a proper understanding of the concept of intellectual property rights.	4.60	0.57	Very High
I possess the skill to cite electronic information when quoting it in my assignments.	4.30	0.77	Very High
I install software that helps protect my electronic devices, such as antivirus programs.	4.28	0.88	Very High
I make sure to review the rules and regulations related to combating crimes.	4.04	0.95	High
I possess the skill of critically evaluating the information I obtain from the internet.	3.98	0.84	High
I use protection software to block websites with harmful digital content.	3.96	1.12	High
I use plagiarism detection tools when submitting assignments and research remotely.	3.84	1.14	High

Table (8) shows that the mean statements related to the intellectual property rights ranged from (3.84) to (4.63) and standard deviations from (1.14) to (0.57). This implies that the statements are at a high to very high level. The statement “I am aware of the negative effects of downloading unknown and unverified programs and applications” ranked highest among the statements with a mean of (4.63) and a standard deviation of (0.59). This is because the statement highlights the importance of respecting intellectual property rights in using unlicensed software, which somewhat overlaps with the concept of respecting usage laws. Therefore, the high awareness of this statement is justified based on these considerations. Moreover, the results indicate that the statement “I use plagiarism detection tools when submitting assignments and research remotely” received the lowest mean score (3.84) with a standard deviation of (1.14). The lower score for this statement can be attributed to the fact that IT and Science students may not prioritize using plagiarism detection tools. This is simply because there is a belief among students that they are conducting their own research or assignments confidently based on their knowledge and skills.

Upon analyzing the content of the document "Life Skills and University Learning," we found that it addressed several aspects of intellectual property (Foundation Institute, 2018):

- The document emphasizes the necessity of documenting the sources from which academic content is quoted and refers to the University of Nizwa's regulations governing intellectual property rights.
- The document warns of the dangers of certain websites and the possibility of hacking devices and stealing files, thus enhancing students' awareness of protecting their intellectual output.
- The document addresses the regulations for combating cybercrimes.

This finding also aligns with the "Guidelines for E-learning" document (University of Nizwa, 2021), which includes strict mechanisms and procedures for protecting intellectual property rights and combating plagiarism, such as:

- The document explicitly states that students are assigned various model assignments/studies to prevent cheating and must use software tools such as Turnitin for similarity detection. This reinforces students' awareness of the importance of academic originality and warns them of the consequences of plagiarism.
- • The document repeatedly refers to the Student Academic Misconduct Policy, stating that violators will receive a warning from examiners/proctors and be asked to withdraw from the exam. This creates a strong deterrent against intellectual property rights violations.
- • The document outlines strict procedures during exams, such as prohibiting students from accessing websites, books, or handouts without explicit permission from the instructor. This protects the integrity of the assessment and safeguards the rights of intellectual property owners.
- This outcome also aligns with the stringent procedures outlined in the "Guidelines for Online Final Examination for Students" document (University of Nizwa, 2020) to protect academic integrity and prevent plagiarism. These procedures include:
 - • Students are not permitted to access other websites, applications, books, notes, or any form of communication without the instructor's permission.
 - • Students must use a secure exam browser that prevents navigating between websites, copying, and pasting.
 - • Students may not seek assistance from the proctor or any other person during the exam except for technical reasons, and this assistance must be provided through the chat box.
 - • Students may receive warnings from instructors/proctors and be required to stop when they violate the Student Academic Misconduct Regulations.

An analysis of the three documents reveals that they establish a comprehensive system for protecting intellectual property rights. This integration of awareness, institutional framework, and practical application explains the high level of student awareness of intellectual property rights.

Results of Research Question 2

The researchers employed an independent samples t-test to address the second question, which states Are there statistically significant differences at the significance level ($\alpha \leq 0.05$) in the level of awareness of digital ethical values among the study sample attributed to the variable of major? The results are presented in Table (9).

Table (9): Results of the Independent Samples T-Test for the Major Variable.

Dimension	Major	No.	M	S.D.	Degrees of Freedom	t-value	Sig.
Respect for Usage Rules	Sciences	32	4.56	0.59	107	1.78	0.08
	Information Technology	77	4.72	0.33			
Etiquette in Communication with Others	Sciences	32	4.16	0.61	107	1.20	0.23
	Information Technology	77	4.27	0.37			
Intellectual Property Rights	Sciences	32	4.18	0.79	107	0.85	0.40

Overall	Information Technology	77	4.30	0.56			
	Sciences	32	4.30	0.63	107	1.33	1.86
	Information Technology	77	4.42	0.37			

Table (9) shows that there are no statistically significant differences at the significance level ($\alpha \leq 0.05$) in the awareness level of digital ethical values among the participants attributed to the major variable between Sciences and Information Technology. This can be attributed that both majors receive the same training and awareness opportunities provided by the University of Nizwa. Furthermore, the Educational Technology course, which is offered to all majors within the Education Department, addressed ethical and digital values. This result differs from Al-Buqami (2021), who reported statistically significant differences in digital value awareness across academic disciplines.

8. Recommendations

Based on findings that demonstrate a high level of awareness of digital ethics among university students, the study recommends focusing on supporting and enhancing this awareness through ongoing educational and outreach initiatives within the university environment. The study also emphasizes the importance of developing students' critical thinking skills and their ability to effectively evaluate digital information, along with encouraging safe and responsible technology use.

9. Suggestions for Future Research

A study examining the impact of training programs based on digital ethics on students' technological practices, using an appropriate research design (e.g., quasi-experimental or mixed-methods).

1. A qualitative study exploring awareness of digital ethics through interviews or focus groups to reveal the depth of understanding and actual practices underlying quantitative findings.
2. A comparative study investigating levels of digital ethics awareness across different universities (public and private) or across different educational stages.
3. A study examining the role of faculty members in promoting digital ethics among students through teaching strategies and assessment practices.

Declarations

Authors' contributions

Aflah Al Kindi and Nasser Almazidi designed the study and drafted the manuscript. Mahmood Al-Waaili reviewed the findings and contributed to the writing of the manuscript. All authors reviewed and approved the final version of the manuscript Aflah Al Kindi is the guarantor.

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Data availability

The data are available from the corresponding author upon reasonable request.

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Studies Committee in the Department of Education at the University of Nizwa. Informed consent was obtained from all participants prior to their involvement in the study. Participants were informed that completing and returning the questionnaire implied their consent to participate. Confidentiality of their responses was maintained throughout the research process.

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During the preparation of this work, the authors used artificial intelligence tools (ChatGPT and Deepseek) for proofreading and language enhancement. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the content of this publication.

Consent for publication

Not applicable, as the manuscript does not contain any individual person's data, images, or identifying information.

Competing interests

The authors declare no competing interests.

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