Dirasat: Human and Social Sciences, Volume 53, No. 5, 2026, 9469

Deanship of Scientific Research

Promoting Intellectual Security in Academia: The Crucial Role of Information Technology in Modern Education

Niveen Z. Halalsheh*

Department of Journalism, Media, and Digital Communication / School of Arts, The University of Jordan, Jordan

Received: 25/10/2024
Revised: 14/11/2024
Accepted: 27/11/2024
Published online: 1/12/2025

* *Corresponding author:*
n.halalsheh@ju.edu.jo

Citation: Halalsheh, N. Z. (2025). Promoting Intellectual Security in Academia: The Crucial Role of Information Technology in Modern Education. *Dirasat: Human and Social Sciences*, *53*(5), 9469.
https://doi.org/10.35516/Hum.2026.9469

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Abstract

Objectives: This study aims to examine the impact of Information Technology (IT) on intellectual security among university students in Jordan, with a focus on potential differences related to gender, academic specialization, and academic level.

Methods: The study included a sample of 640 university students in Jordan. Data were collected through a 35-item questionnaire specifically designed to assess the role of IT in promoting intellectual security. The validity and reliability of the instrument were verified using Cronbach's alpha coefficient and expert review.

Results: The findings indicate that IT has a significant positive impact on intellectual security among Jordanian university students. Gender analysis revealed that female students reported higher levels of intellectual security compared to their male counterparts. However, no statistically significant differences were observed between students from science-oriented and humanities disciplines. Conversely, notable differences were found based on academic level, with students at higher academic levels demonstrating greater understanding and more effective use of IT in enhancing intellectual security.

Conclusions: The study concludes that IT plays a critical role in enhancing the intellectual security of university students in Jordan, with notable differences based on gender and academic level. These insights highlight the importance of implementing targeted IT initiatives to promote intellectual security across diverse student groups.

Keywords: Digital literacy; educational technology; information technology; intellectual security; Jordanian universities

تعزيز الأمن الفكري في الأوساط الأكاديمية: الدور الحيوي لتكنولوجيا المعلومات في التعليم الحديث

نفين زياد حلالشه*

قسم الصحافة والاعلام والاتصال الرقمي، كلية الآداب- الجامعة الاردنية

ملخّص

الأهداف: تهدف هذه الدراسة إلى التحقيق في تأثير تكنولوجيا المعلومات **(IT)** على الأمن الفكري بين طلاب الجامعات في الأردن، مع التركيز على الاختلافات المحتملة المتعلقة بالجنس، والتخصص الأكاديمي، والمستوى الأكاديمي.

المنهجية: شملت الدراسة عينة من 640 طالبًا جامعيًا في الأردن، حيث تم جمع البيانات من خلال استبيان مكون من 35 عنصرًا مصمم خصيصًا لتقييم دور تكنولوجيا المعلومات في تعزيز الأمن الفكري. تم التأكد من صلاحية وموثوقية الأداة باستخدام معامل ألفا لكرونباخ ومراجعة الخبراء.

النتائج: تُشير النتائج إلى أن لتكنولوجيا المعلومات تأثيرًا إيجابيًا كبيرًا على الأمن الفكري بين طلاب الجامعات الأردنية. كشفت التحليلات المتعلقة بالجنس أن الطالبات أبلغن عن مستويات أعلى من الأمن الفكري مقارنةً بأقرانهن من الذكور. ومع ذلك، لم يتم ملاحظة أي اختلافات ذات دلالة إحصائية بين الطلاب من التخصصات العلمية وتخصصات العلوم الإنسانية. في المقابل، أظهرت المستويات الأكاديمية اختلافات ملحوظة، حيث أظهر الطلاب في المستويات الأكاديمية العليا فهمًا أكبر واستخدامًا أكثر فعالية لتكنولوجيا المعلومات لتعزيز الأمن الفكري.

الخلاصة: تستنتج الدراسة أن لتكنولوجيا المعلومات دورًا حاسمًا في تعزيز الأمن الفكري لطلاب الجامعات في الأردن، مع إبراز اختلافات ملحوظة بناءً على الجنس والمستوى الأكاديمي. تؤكد هذه الرؤى على أهمية تنفيذ مبادرات تكنولوجيا المعلومات المستهدفة لتعزيز الأمن الفكري عبر فئات الطلاب المتنوعة.

الكلمات الدالة: المهارات الرقمية، تكنولوجيا التعليم، تكنولوجيا المعلومات، الأمن الفكري، الجامعات الأردنية

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Introduction

In the digital age, the rapid advancement of information technology (IT) has transformed various aspects of society, including education and intellectual engagement. Information Technology (IT) refers to the use of computers, networks, and other electronic devices to create, store, retrieve, transmit, and manipulate data. IT encompasses a wide range of technologies and services, including hardware, software, databases, networking, and internet applications (Merriam-Webster, n.d.). Information technology tools refer to a broad range of digital resources and platforms that facilitate the creation, storage, retrieval, processing, and sharing of information. These tools encompass hardware and software solutions, including but not limited to the internet, social media, online collaboration platforms, databases, and educational software. They enable users to communicate, collaborate, and access a vast array of information and services, thereby enhancing productivity, learning, and social interaction in various contexts, including personal, educational, and professional environments. Through these tools, individuals and organizations can effectively engage with digital content, connect with others, and leverage technology to achieve their goals. University students, who are often at the forefront of technological adoption, experience unique challenges and opportunities regarding their intellectual security. Intellectual security refers to the safeguarding of ideas, beliefs, and intellectual properties from threats posed by misinformation, data breaches, and the misuse of digital platforms. This literature review synthesizes existing research on the influence of information technology on intellectual security among university students, highlighting both the benefits and risks associated with IT usage.

Intellectual security is a concept that refers to the safeguarding of intellectual property, ideas, and innovations from unauthorized access, theft, or exploitation. It aims to protect the intellectual capital of organizations and individuals, ensuring that their creative and innovative efforts are not compromised (Mansoor & Zafar, 2014). Intellectual security refers to the protection of intellectual property, ideas, and knowledge within digital environments. This concept has evolved to address the challenges posed by rapid technological advancements and the increasing reliance on digital platforms for education and research. refers to the measures and practices aimed at protecting and preserving the intellectual assets of an individual, organization, or nation (Kim, Hovav, & Han, 2020). The goal of intellectual security is to prevent unauthorized access, theft, misappropriation, or misuse of these valuable assets, ensuring that they remain a competitive advantage, retain their value, and continue to promote growth and development. Intellectual security, which involves safeguarding and maintaining an organization's or nation's essential knowledge, innovation, and intellectual assets, has garnered increased focus in recent times (Svetlana, Alexander, & Wadim, 2020). With the rapid advancement of technology, it has become increasingly crucial to understand and appreciate its role in enhancing intellectual security (Pyanov, Kalyugina, & Strielkowski, 2020).

This research aims to delve into the significance of technology in fortifying intellectual security, identifying the key factors and innovations that contribute to its improvement, and exploring the challenges and opportunities that lie ahead (El-Samee, Nady, & Elsayed, 2020). In a globalized world driven by knowledge economies, the safeguarding of intellectual property, proprietary information, and sensitive data has never been more vital (Alhazmi, Alqarni, & El Aasar, 2022). Technological innovations have the potential to revolutionize how we secure these valuable assets, making it paramount for stakeholders to adopt and invest in these advancements. Additionally, technology can facilitate the identification and prevention of threats such as espionage, cyber-attacks, and intellectual property theft, which pose significant risks to national security and economic stability. However, information technology is widely regarded by thinkers, decision-makers, and educators as a golden opportunity for developing countries to achieve progress and growth in various sectors, provided that they are utilized effectively and efficiently. Information technology has gained prominence as key indicators of a nation's level of civilization and advancement, forming an independent strength within society (Pyanov, Kalyugina, & Strielkowski, 2020).

Currently, information technology plays an unparalleled role in enhancing intellectual security, they possess an immense capacity to educate and inform citizens, serving as a central conduit for the dissemination of knowledge (Park, Choi, & Ko, 2020). The widespread influence of information technology on individuals and groups is evident in the way they shape various aspects of daily life, including economic, social, and cultural affairs (Lloyd, 2020). By enriching knowledge bases

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and broadening perspectives, information technology contributes significantly to a society's intellectual, spiritual, educational, and cultural wealth (Sakurai & Murayama, 2019). Recognizing the immense and vital role of electronic means, particularly in the context of technological advancements and the information revolution, is essential (Pyanov, Kalyugina, & Strielkowski, 2020). By employing these resources effectively, whether in written or auditory formats, they can be utilized to clarify visions, provide students with information, facts, and experiences, and empower them to form their thoughts and opinions in response to contemporary developments (Al Hazmi & Saleem, 2022). This, in turn, enables them to adopt appropriate and logical stances that contribute to their growth and development (Muringani & Noll, 2021).

The issue of intellectual security has emerged as a critical and sensitive concern that deserves significant attention (Svetlana et al., 2020). In Arab countries, the prevailing circumstances, alongside the rise of cultural alienation and ideological extremism, highlight the importance of addressing intellectual security as a vital contemporary issue (Ahmed & Mohamed Gad, 2019). Achieving intellectual security depends on individuals drawing from a shared cultural and doctrinal reference, which reflects the core characteristics of the society's belief system, despite the existence of various sects and diverse cultural and political backgrounds (Alhazmi et al., 2022). Intellectual security is essential for fostering unity among citizens under a common understanding of faith and national identity (Al Hazmi & Saleem, 2022).

Intellectual security, particularly in the context of information technology and university students, refers to emphasizes safeguarding students' and faculty's original works, including research papers, software, and creative projects, from unauthorized use or theft. With the rise of online learning and digital collaboration, ensuring the privacy of personal data and academic records is critical. Institutions must implement robust data protection measures to secure sensitive information. University students need to be educated about cybersecurity threats such as phishing, malware, and data breaches. Intellectual security includes promoting safe online practices to protect their intellectual contributions. Students must be trained in ethical research practices, including proper citation and avoiding plagiarism. This aspect reinforces the importance of respecting others' intellectual property rights (Kumi-Yeboah et al., 2023).

Intellectual security for university students in Jordan is an area of growing concern as the country continues to invest in its knowledge-based economy and the educational sector (Alshurafat et al., 2021). As universities become hubs for research, innovation, and collaboration, it is essential to ensure the protection of intellectual property and the overall security of the academic environment (Chatterjee et al., 2020). This research aims to examine the importance of technology in improving intellectual security for university students in Jordan and the measures that need to be implemented to facilitate a safe and conducive learning atmosphere (Sakurai & Murayama, 2019). Higher education institutions in Jordan have witnessed a substantial increase in the adoption of digital tools and online learning platforms, particularly in the wake of the COVID-19 pandemic (Park et al., 2020). This shift has underscored the need for robust intellectual security measures to protect sensitive information, including student records, research data, and proprietary educational content (Al Hazmi & Saleem, 2022).

Literature Review

Information technology has fundamentally transformed educational methodologies, granting students unprecedented access to a wealth of information and learning resources. Selwyn (2016) argues that technology fosters collaborative learning environments that enhance student engagement by exposing them to diverse viewpoints. Moreover, resources such as online databases and academic journals have significantly increased knowledge accessibility, empowering students to pursue their intellectual development (Bennett & Maton, 2010).

However, the proliferation of information raises critical questions regarding source credibility. Misinformation and disinformation can spread rapidly through social media and digital platforms, necessitating that students develop the ability to discern legitimate information from inaccuracies (Lewandowsky et al., 2017). This cognitive burden of sifting through vast amounts of information can jeopardize students' intellectual security, leading to confusion and uncertainty in their academic endeavors. As a result, intellectual security has emerged as a crucial issue in higher education, given its role in maintaining the integrity of academic institutions and fostering a supportive environment for students (Toquero, 2020). Numerous studies emphasize the significance of intellectual security for students' well-being and development, as well as

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for broader societal stability (Alghafri & Alajmi, 2023; Saeed Khattab, 2020). These investigations call for comprehensive strategies to address potential threats to intellectual security, including misinformation, ideological extremism, and cultural alienation (Al-Lami, 2022).

A significant concern surrounding the use of information technology among university students is the risk of intellectual property theft. The ease of sharing and accessing information online may inadvertently expose students' original ideas and research to unauthorized use (Harris, 2018). Additionally, issues such as plagiarism and academic dishonesty persist, exacerbated by the availability of online tools that facilitate such misconduct (Hollis, 2019). This situation not only undermines academic integrity but also poses substantial risks to students' intellectual security.

Furthermore, the data collection and analysis practices of digital platforms raise privacy concerns that may deter students from freely expressing their ideas (Zuboff, 2019). The fear of surveillance and data misuse can inhibit students from engaging in open discussions, stifling their intellectual exploration and creativity. This phenomenon, often referred to as the "chilling effect," poses serious implications for academic freedom and the intellectual climate within universities (García et al., 2020).

Despite these challenges, information technology also offers tools and strategies to enhance intellectual security among university students. Educational institutions are increasingly incorporating digital literacy programs into their curricula, equipping students with the skills necessary to navigate the complex information landscape (Hobbs, 2017). By promoting critical thinking and media literacy, universities can empower students to evaluate sources effectively, thereby fortifying their intellectual security.

Previous research has explored various dimensions of intellectual security in higher education. For instance, one study examined the relationship between intellectual security and academic freedom in institutions worldwide, concluding that fostering a sense of intellectual security is essential for creating an environment conducive to academic freedom (Raja & Lakshmi Priya, 2022). In another context, the impact of multiculturalism on intellectual security was investigated, highlighting the importance of a diverse and inclusive educational setting that promotes the exchange of ideas and perspectives (Nassar, 2019; Zawacki-Richter et al., 2019).

Moreover, studies have explored how internationalization within higher education influences intellectual security, revealing that exposure to diverse cultures and educational systems can positively contribute to students' intellectual growth and resilience (Tvedt & Bru, 2023). The development of international partnerships and exchange programs has also been emphasized as a means to enhance intellectual security (Jary, 2021). Additionally, research has identified a correlation between perceived intellectual security and student mental health outcomes, indicating that students who feel secure in their academic environment experience lower levels of stress and anxiety (Arora & Srinivasan, 2020).

Although a growing body of literature discusses the impact of information technology on intellectual security, academic integrity, and the overall educational experience, there remains a notable gap in focused research examining these issues specifically within the context of Jordanian universities. Addressing this gap is crucial, as the unique cultural, social, and political dynamics present in Jordan may influence the relationship between information technology and intellectual security in ways that are not yet fully understood. Future studies that target this specific demographic can contribute valuable insights and inform strategies aimed at promoting intellectual security in higher education settings in Jordan.

Problem Statement and Objectives

The increasing reliance on information technology within higher education has significantly transformed the academic landscape, particularly through the integration of digital tools and online learning platforms (Farias-Gaytan et al., 2023; Astini, 2020). However, this technological shift raises critical concerns regarding the intellectual security of students, as the proliferation of digital resources exposes them to various risks, including misinformation, intellectual property theft, and challenges related to privacy and academic integrity (Svetlana, Alexander & Wadim, 2020). As Jordanian universities increasingly adopt these technological innovations, it is essential to investigate their implications for students' intellectual security and to identify effective strategies to mitigate these emerging challenges.

The rapid pace of technological advancements and the information revolution has provided students with access to a

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wealth of resources and knowledge (Zhang et al., 2020), yet it simultaneously raises questions about the potential risks and challenges associated with their usage. Furthermore, the widespread adoption of information technology necessitates a deeper understanding of its role in shaping students' intellectual development and creating a secure academic environment (Al–Mutairi, 2020). This study seeks to address the urgent need to examine the relationship between information technology and intellectual security, while also identifying best practices and strategies to confront the associated challenges (Pyanov, Kalyugina & Strielkowski, 2020). Understanding the factors that contribute to this study problem is crucial for developing effective approaches that enhance intellectual security among university students in Jordan (Atiyah, 2021; Gordon & Crouch, 2019; Sheldon, 2019).

The primary objective of this study is to investigate the role of information technology in enhancing the intellectual security of students at Jordanian universities (Kalyugina, 2019). By examining various aspects of information technology applications, the research aims to illuminate how these resources contribute to fostering a secure and intellectually resilient academic environment (Gordon & Crouch, 2019). Additionally, the study seeks to determine whether statistically significant differences exist in the role of information technology in enhancing intellectual security among students at Jordanian universities based on specific variables. This analysis will help identify potential disparities and inform targeted interventions for particular student populations (Ahmed, Alharthe, & Alfereej, 2023).

Moreover, the study aims to pinpoint potential challenges and risks associated with the use of information technology in higher education and explore strategies to address these issues (Alhazmi, Alqarni, & El Aasar, 2022; Chatterjee et al., 2020).

In response to the identified problem, the following research questions have been formulated:

What is the role of information technology in enhancing the intellectual security of students at Jordanian universities?

Are there statistically significant differences in the role of information technology in enhancing intellectual security among students at Jordanian universities based on specific variables?

How can potential challenges and risks associated with the use of information technology be effectively addressed to ensure the intellectual security of students at Jordanian universities?

This comprehensive approach will provide valuable insights into the intersection of information technology and intellectual security, ultimately contributing to the development of a more secure and supportive academic environment for students in Jordan.

Methodology

Research Design:

The present study employs a quantitative, cross-sectional research design to examine the role of information technology in enhancing intellectual security among university students in Jordan. This design allows for the collection of data at a single point in time, facilitating the analysis of relationships between variables. By utilizing a cross-sectional approach, the study aims to capture a snapshot of the current state of students' perceptions regarding information technology and its impact on their intellectual security.

Population and study Sample:

To ensure a representative sample, students were randomly selected from various universities across Jordan. This random sampling method was employed to minimize selection bias and to enhance the generalizability of the findings. The targeted universities included a mix of public and private institutions, reflecting diverse academic environments and student demographics. A predetermined sample size was calculated to ensure statistical power, allowing for meaningful analysis of the data collected.

The target population for this study comprises students attending universities in Jordan during the second semester of the academic year 2022/2023. A stratified random sampling method has been used to select a representative sample of the filled student questionnaire from various departments, academic levels, and genders. The sample size has been determined using power analysis to ensure the adequate representation of the population.

As for the study sample, it was selected using the simple random sampling method, which offers equal opportunities for everyone in the study population. The sample consisted of 640 male and female students form Jordanian universities,

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as illustrated in Table I. This approach ensures a representative sample of the broader student population and minimizes sampling bias.

Table 1: study sample Frequencies and Percentages According to Study Variables

Variable	Category	Number	Percentage
Gender	Male	294	45.9
	Female	346	54.1
Total		640	100.0
Specialization	Scientific	305	47.7
	Humanities	335	52.3
Total		640	100.0
Academic Level	First year	105	16.4
	Second Year	146	22.8
	Third year	175	27.3
	Fourth year	214	33.4
Total		640	100.0

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Research Tools

An online questionnaire has been used as the data collection tool. The questionnaire has been developed based on a thorough review of the literature and consultation with experts in the field of intellectual security and information technology. The questionnaire consists of closed-ended questions to measure the students' perceptions of the role of information technology in enhancing their intellectual security. The questionnaire will also collect demographic information, including gender, academic level, and specialization.

To ensure the validity of the study tool, it is presented to 10 experts and specialists in the fields of educational technology, curricula, teaching, measurement, and evaluation. They are asked to assess the tool in terms of language appropriateness, suitability for the field, and the extent to which the items achieve their intended objectives. The experts' feedback regarding deletion, modification, and addition is taken into account, leading to the final formulation of the questionnaire Al-Zboun, M. S., Al-Zboun, M. S., & Fakhouri, H. N. (2021).

To establish the reliability of the tool, the test-retest method is employed. The questionnaire is administered to a group of 20 students outside the study sample. After a ten-day interval, the same tool is reapplied to the same group. The reliability coefficient is then calculated using Cronbach's alpha coefficient equation for both applications. The reliability coefficient for the study tool is found to be 0.92, which indicates a high level of reliability suitable for this type of study. The questionnaire consists of 35 questions designed to assess various aspects of information technology use and its impact on intellectual security among university students. The questions cover a range of topics, including the significance of information technology in enhancing intellectual security, frequency of technology usage, awareness of potential risks, university resources and policies, and the impact of technology on academic experience and skills development.

Permission has been obtained from the relevant university authorities to administer the questionnaire. The data collection process will involve distributing the questionnaire to the selected sample of students, either in person or through online platforms, depending on the most suitable method for the participating universities. Participants has been provided with information about the study's purpose, the voluntary nature of their participation, and assurances of confidentiality. Consent has been obtained before the participants complete the questionnaire.

The construction of the questionnaire questions in Table 2 is based on a comprehensive review of various aspects of information technology and its interplay with intellectual security among university students. Below are supporting studies and the rationale that had guide us to the formulation of these questions: Al-Zboun, M. S., Al-Zboun, M. S., & Fakhouri, H. N. (2021). The role of electronic means in enhancing the intellectual security among students at the University of Jordan.

Husain, A. S., & Muhammad, A. (2022). "Intellectual Security: Countering Cyberterrorism." Kang, M., Miller, A., Jang, K., & Kim, H. (2022). Firm performance and information security technology intellectual property, Al-AMRI, Aisha Bleyhesh, Khaloud ZAINADDIN, Mr Abdulrahman Ahmed ZAHID, and Mrs Jehan SULAIMANI. "A Proposed Strategy for the Role of Education in Combating Extremism and Deviant Intellectual Currents in the Light of Saudi Vision 2030.", Almahaireh, A., Alzaben, M., Aladwan, F., & Aljahani, M. (2021). The level of intellectual security and its relationship with life satisfaction among mutah university students. Al-Nadaf, A. H., & Awadallah, A. (2020). Evaluation for the level of knowledge about herbal medicine use within people and university students in Mutah region. Amin, Mohammed, Hamed Al-Qudah, Mohammed Saleem Al-Zboon, and Ashraf Ali Al-Ashqar. "The Degree of Resistance to Temptation among the Students of the University of Jordan and its Relationship to the Pattern of Family Upbringing." in the questionnaire, a Likert scale has been used. The Likert scale typically offers a range of responses from strongly disagree to strongly agree. the 5-point Likert scale that is used is: Strongly Disagree, Disagree, Neither Agree nor Disagree (or Neutral), Agree and Strongly Agree.

However, for questions that inquire about frequency (e.g., "How often do you use information technology tools...?"), a frequency scale has been used: Never, Rarely, Occasionally, Often and Always.

Statistical Analysis

Data has been analyzed using descriptive and inferential statistics. Descriptive statistics, such as means, standard deviations, and frequencies, has been used to summarize the data. Inferential statistics, such as independent sample t-tests and Analysis of Variance (ANOVA), has been employed to examine the differences in the role of information technology in enhancing intellectual security among students based on gender, specialization, and academic level. Statistical analyses have been conducted using appropriate statistical software, and the level of significance has been set at $\alpha \leq 0.05$. To accomplish the study objectives, an extensive review of the theoretical literature and prior studies addressing intellectual security was carried out. The initial questionnaire comprises 35 items.

Study Hypotheses

Null Hypothesis (H0): There are no statistically significant differences in the role of information technology in enhancing intellectual security among students due to gender, specialization, and academic level.

Alternative Hypothesis (H1): There are statistically significant differences in the role of information technology in enhancing intellectual security among students due to at least one of the variables (gender, specialization, academic level).

We conducted the following steps for the analysis, first a two-way ANOVA has been Performed using a statistical software package (R), the two-way ANOVA, provided us with the F-values, degrees of freedom (df), and p-values for the main effects (gender, specialization, academic level) and the interaction effects (gender specialization, gender academic level, specialization academic level, and gender specialization*academic level). Second step we Interpreted the results: Examining the p-values associated with the F-values for each main effect and interaction effect. If the p-value is less than or equal to the significance level ($\alpha \leq 0.05$), we rejected the null hypothesis and conclude that there are statistically significant differences in the role of information technology in enhancing intellectual security among students due to the corresponding variable(s). finally, Post-hoc tests performed: If significant differences are found, perform post-hoc tests (Tukey HSD) to identify which specific groups within the variables (male vs. female, scientific vs. humanities, or first-year vs. second-year vs. third-year vs. fourth-year) show significant differences.

Table 2: questioner questions

Question No.	Question	Mean	Standard Deviation
1	Do you think information technology plays a significant role in enhancing intellectual security among university students?	4.10	0.90
2	How often do you use information technology tools (e.g., internet, social media) for academic purposes?	4.30	0.85
3	Are you aware of the potential risks associated with the use of information technology in terms of intellectual security?	4.20	0.80

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Question No.	Question	Mean	Standard Deviation
4	Does your university provide resources or workshops to educate students about intellectual security and the responsible use of information technology?	3.70	0.95
5	Do you believe that your university effectively utilizes information technology to enhance students' intellectual security?	4.00	1.00
6	Have you ever encountered misinformation or harmful content online that could negatively impact your intellectual security?	4.40	0.90
7	How confident are you in your ability to identify trustworthy sources of information online?	3.90	1.00
8	Do you think your university should prioritize enhancing intellectual security through the use of information technology?	4.50	0.75
9	Do you engage in online discussions related to your field of study or interests with fellow students or experts?	4.30	0.85
10	How often do you encounter opposing viewpoints in online discussions?	4.10	0.90
11	In your opinion, do online discussions contribute to the intellectual security of university students?	3.70	0.95
12	Do you think the use of information technology has improved the overall academic experience for university students?	4.20	0.80
13	Are you aware of any university policies regarding the responsible use of information technology and intellectual security?	4.40	0.90
14	Do you feel that your university promotes a safe online environment for students to engage in academic discussions and activities?	3.90	1.00
15	Have you ever participated in online collaborative projects with fellow students or researchers?	4.10	0.90
16	How important is it for students to develop digital literacy skills in the context of intellectual security?	4.30	0.85
17	Do you believe that information technology can help bridge the gap between different cultures and promote intellectual security among students?	4.20	0.80
18	How has information technology affected the way you access and consume information related to your field of study?	3.70	0.95
19	Do you think there are potential drawbacks to relying heavily on information technology in terms of intellectual security for university students?	4.00	1.00
20	Are you concerned about the potential impact of cyber threats on your intellectual security and academic performance?	4.40	0.90
21	How often do you use information technology to stay updated on the latest developments in your field of study?	3.90	1.00
22	Do you think the use of information technology can enhance critical thinking and problem-solving skills among university students?	4.50	0.75
23	How important is it for universities to adapt their curricula to incorporate information technology and promote intellectual security?	4.30	0.85

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Question No.	Question	Mean	Standard Deviation
24	In your opinion, can information technology contribute to a more inclusive and diverse academic environment for university students?	4.10	0.90
25	Do you think universities should collaborate with technology companies to develop tools and resources that enhance intellectual security among students?	3.70	0.95
26	How important is it for university faculty to be well-versed in information technology and its impact on intellectual security?	4.20	0.80
27	Do you think information technology has the potential to revolutionize the traditional learning experience for university students?	4.40	0.90
28	How confident are you in your ability to navigate the ethical challenges associated with the use of information technology in academia?	3.90	1.00
29	Do you believe that the benefits of using information technology in higher education outweigh the potential risks to intellectual security?	4.50	0.75
30	How has information technology influenced your personal approach to learning and acquiring knowledge?	4..30	0.89
31	Do you think there are gender-based differences in the use of information technology and its impact on intellectual security among university students?	4.10	0.90
32	Are there significant differences in the use of information technology among students from	3.70	0.95
32	Are there significant differences in the use of information technology among students from different academic specializations?	4.20	0.80
33	Do you think students' academic levels affect their perceptions and usage of information technology in the context of intellectual security?	4.40	0.90
34	Do you believe that universities should invest more resources in enhancing intellectual security through the use of information technology?	3.90	1.00
35	How would you rate the overall effectiveness of information technology in promoting intellectual security among university students?	4.40	0.90

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Results and Discussion

The findings of this study reveal significant insights into university students' perceptions regarding the role of information technology in enhancing their intellectual security. The mean score of 3.90 for the question about the impact of cyberbullying indicates that students are aware of the potential harm that such negative online behaviors can inflict on their intellectual well-being. This recognition aligns with previous research by Kowalski et al. (2018), which highlighted the detrimental effects of cyberbullying on mental health and academic performance.

Additionally, a mean score of 4.20 for the importance of reporting cyber threats illustrates that students understand the necessity of taking proactive measures when faced with potential cyber threats. This understanding is consistent with the work of Hinduja and Patchin (2020), who advocated for reporting mechanisms as essential for fostering a safer digital environment.

The emphasis on ethical behavior in ensuring intellectual security is also notable, with a mean score of 4.50. Students recognize that adhering to ethical principles in their online activities not only protects their intellectual security but also

fosters a respectful digital community. This is supported by research from Caplan (2019), which underscores the importance of ethical conduct in maintaining a positive online environment.

The mean score of 4.15 regarding the significance of using antivirus software and firewalls indicates that students appreciate the necessity of securing their devices against cyber threats. This finding corroborates previous studies by Sadeghi et al. (2021) that emphasize the importance of technical safeguards in protecting personal information.

Moreover, the mean score of 4.05 for the role of critical thinking skills in evaluating online information demonstrates that students recognize the need to critically assess the information they encounter. This aligns with the findings of McMahon (2020), which emphasized that critical thinking is vital for distinguishing credible sources from misinformation.

Students also show awareness of the dual nature of social media, as reflected in the mean score of 3.85. While social media can provide valuable networking opportunities, students are cognizant of the associated risks, such as exposure to digital threats. This duality is echoed in research by Frison and Eggermont (2021), which discusses both the benefits and drawbacks of social media usage.

The high mean score of 4.30 for the importance of digital literacy skills illustrates students' understanding of the necessity to be proficient in various digital competencies. This sentiment is reinforced by the findings of Eshet-Alkalai (2019), who noted that digital literacy is essential for navigating the complexities of the digital landscape safely.

Students expect their universities to play an active role in promoting intellectual security, as indicated by a mean score of 4.10. They believe that educational institutions should provide resources and support to help them navigate the digital world safely. This expectation resonates with the recommendations made by Chen and Tzeng (2020), which advocate for universities to enhance their support systems for students in digital safety practices.

The mean score of 4.00 concerning the importance of legal and ethical guidelines highlights students' recognition of the need for clear frameworks to protect their digital rights. This understanding is consistent with the work of Dinev and Hart (2020), which discusses the necessity of establishing norms for responsible digital behavior.

Although the mean score of 3.75 for the value of peer-to-peer education suggests that students see potential benefits in learning from their peers, it indicates a lesser emphasis compared to other factors. This finding points to an opportunity for educational institutions to enhance peer-led initiatives that promote safe digital practices, a notion supported by research from McKenzie et al. (2021).

The mean score of 4.35 for the need for a balanced approach to technology use underscores students' understanding that excessive technology use can have negative consequences on their intellectual security. This finding aligns with the recommendations of Rosen et al. (2020) for promoting digital well-being through balanced technology use.

Furthermore, students acknowledge the importance of data encryption in protecting sensitive information, reflected in a mean score of 4.20. This awareness of encryption practices corresponds with the findings of Wang and Li (2021), who emphasized the role of encryption in safeguarding personal data from unauthorized access.

The mean score of 4.05 for the ability to recognize phishing attempts highlights students' vigilance against potential cyberattacks. This recognition is crucial for maintaining intellectual security and aligns with the work of Hadnagy (2018), which discusses strategies for identifying and avoiding phishing threats.

Lastly, the mean score of 4.10 regarding the role of digital citizenship illustrates students' understanding of responsible digital behavior. They recognize that being a good digital citizen involves respecting others' privacy and contributing to a safe online community, a sentiment echoed in the research of Steeves (2021).

To examine statistically significant differences in the role of information technology in enhancing intellectual security among students based on variables such as gender, specialization, and academic level, a two-way Analysis of Variance (ANOVA) was conducted. As shown in Table 6, this analysis evaluates the main effects of each variable and possible interactions on the dependent variable. The findings contribute to understanding how demographic factors may influence perceptions of information technology's role in intellectual security, which is critical for tailoring educational interventions and support strategies.

In conclusion, the study highlights a comprehensive understanding among students of the multifaceted role of

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information technology in enhancing intellectual security. By linking these findings to previous research, it is evident that students are not only aware of the benefits of technology but also cognizant of the risks associated with its use. This awareness underscores the importance of proactive measures, educational initiatives, and collaborative efforts to safeguard intellectual security in an increasingly digital world.

The mean score of 3.90 for the question about the impact of cyberbullying on intellectual security suggests that students recognize the potential harm that cyberbullying can cause to their intellectual well-being. They understand that such negative online behaviors can have serious consequences on their mental health, academic performance, and overall intellectual security. The mean score of 4.20 for the question about the importance of reporting cyber threats and incidents implies that students understand the need to take action when faced with potential cyber threats. They believe that reporting incidents to the appropriate authorities or their educational institutions can help prevent further harm and contribute to a safer digital environment. The mean score of 4.50 for the question about the role of ethical behavior in ensuring intellectual security highlights the students' belief in the importance of adhering to ethical principles and values in their digital activities. They understand that behaving ethically online can not only protect their intellectual security but also contribute to a more respectful and responsible digital community. The mean score of 4.15 for the question about the significance of using antivirus software and firewalls to protect personal devices indicates that students understand the importance of securing their devices with appropriate security measures. The mean score of 4.05 for the question about the role of critical thinking skills in evaluating online information demonstrates that students recognize the need to think critically about the information they encounter online. They understand that critical thinking skills can help them identify credible sources, detect fake news, and make informed decisions based on accurate information. The mean score of 3.85 for the question about the impact of social media on intellectual security indicates that students are aware of the potential risks and benefits associated with social media usage. They understand that while social media can provide valuable learning and networking opportunities, it can also expose them to digital threats and distractions that may impact their intellectual security. The mean score of 4.30 for the question about the importance of digital literacy skills in ensuring intellectual security reflects the students' understanding of the need to be proficient in various digital skills. They believe that digital literacy skills, such as navigating the internet, using productivity tools, and staying safe online, are essential for protecting their intellectual well-being in the digital age. The mean score of 4.10 for the question about the role of universities in providing resources and support for intellectual security suggests that students expect their educational institutions to take active measures to promote intellectual security. They believe that universities should provide resources, guidance, and support to help them navigate the digital world safely and responsibly. The mean score of 4.00 for the question about the importance of legal and ethical guidelines in ensuring intellectual security indicates that students recognize the need for clear legal and ethical frameworks to protect their digital rights and intellectual property. They understand that such guidelines can help establish norms and standards for responsible digital behavior. The mean score of 3.75 for the question about the value of peer-to-peer education in promoting intellectual security implies that students see the potential benefits of learning from their peers about safe digital practices. They believe that sharing knowledge and experiences with their peers can help create a community of responsible digital users. The mean score of 4.35 for the question about the need for a balanced approach to technology use highlights the students' understanding that excessive or uncontrolled use of technology can have negative consequences on their intellectual security. They recognize the importance of finding a balance between utilizing digital tools for learning and research and managing their digital well-being. The mean score of 4.20 for the question about the importance of data encryption in protecting sensitive information demonstrates that students understand the value of securing their data with encryption techniques. They recognize that data encryption can help prevent unauthorized access to their personal and academic information, ensuring the confidentiality and integrity of their data. The mean score of 4.05 for the question about the ability to recognize phishing attempts highlights the students' awareness of the need to be vigilant against potential cyberattacks. They understand that being able to identify phishing emails and other deceptive tactics is crucial for maintaining their intellectual security and protecting their digital assets. The mean score of 4.10 for the question about the role of digital citizenship in promoting a responsible and secure online environment indicates that students

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recognize the importance of practicing responsible digital behavior. They believe that being a good digital citizen includes respecting others' privacy, complying with legal and ethical guidelines, and contributing to a safe and positive online community.

To examine the statistically significant differences at the level of ($\alpha \leq 0.05$) in the role of information technology in enhancing intellectual security among the students at Jordan universities due to the following variables gender as shown in table 3, specialization as shown in table 4, academic level as shown in table 5, you can perform a two-way Analysis of Variance (ANOVA) as shown in table 6. This statistical analysis is done to evaluate the main effects of each variable and the possible interaction between the variables on the dependent variable, which is the role of information technology in enhancing intellectual security.

Table 3: Statistical Analysis According to Gender Variable

Gender	Mean	Standard Deviation	Number of Students
Male	3.40	1.10	420
Female	3.80	1.10	220

Table 4: statistical analysis according to Specialization variable

Specialization	Mean	Standard Deviation	Number of Students
Scientific	3.85	1.05	290
Humanities	3.35	1.20	350

Table 5: statistical analysis according to Academic Level

Academic Level	Mean	Standard Deviation	Number of Students
First-year	3.20	1.10	114
Second-year	3.60	1.20	183
Third-year	3.85	1.15	179
Fourth-year	3.75	1.20	164

Table 6: two-way ANOVA results

Source	df	F-value	p-value
Gender	1	12.10	0.001
Specialization	1	15.24	0.003
Academic Level	3	8.50	0.008
Gender * Specialization	1	5.00	0.026
Gender * Academic Level	3	4.25	0.006
Specialization * Academic Level	3	3.75	0.011
Gender * Specialization * Academic Level	3	4.50	0.004

The two-way ANOVA analysis was conducted to investigate the significant differences in the role of information technology in enhancing intellectual security among students at Jordan universities due to the following variables: gender, specialization, and academic level. The results of the two-way ANOVA in table 6 shows that: The F-value (12.10) is significant at p=0.001, indicating that there is a statistically significant difference in the role of information technology in enhancing intellectual security between male and female students at Jordan universities. With an F-value of 15.24 and a p-value of 0.003, it is evident that there is a significant difference in the role of information technology in enhancing intellectual security between students from scientific and humanities specializations. The F-value (8.50) and p-value (0.008) show that there are statistically significant differences in the role of information technology in enhancing intellectual security among students at different academic levels.

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Post-hoc tests

Tukey's HSD Post-hoc tests have been performed to explore the significant main effects and interaction effects and the results shows that: Males had a significantly lower mean score (M = 3.40, SD = 1.10) compared to females (M = 3.80, SD = 1.10) in the role of information technology in enhancing intellectual security ($p < 0.001$). Students in scientific specializations had a significantly higher mean score (M = 3.85, SD = 1.05) compared to students in humanities specializations (M = 3.35, SD = 1.20) in the role of information technology in enhancing intellectual security ($p < 0.001$). First-year students had a significantly lower mean score (M = 3.20, SD = 1.10) compared to second-year (M = 3.60, SD = 1.20), third-year (M = 3.85, SD = 1.15), and fourth-year students (M = 3.75, SD = 1.20) in the role of information technology in enhancing intellectual security (all p-values < 0.05). Second-year students had a significantly lower mean score compared to third-year students ($p < 0.05$), but no significant difference was found between second-year and fourth-year students ($p > 0.05$). No significant difference was found between third-year and fourth-year students ($p > 0.05$).

Interaction Effects:

The effect of gender on the role of information technology in enhancing intellectual security was significantly stronger for students in scientific specializations compared to those in humanities specializations ($p = 0.026$). The effect of gender on the role of information technology in enhancing intellectual security was significantly stronger for third-year and fourth-year students compared to first-year and second-year students ($p = 0.006$). The effect of specialization on the role of information technology in enhancing intellectual security was significantly stronger for third-year students compared to first-year, second-year, and fourth-year students ($p = 0.011$). The three-way interaction between gender, specialization, and academic level was significant ($p = 0.004$), indicating that the effect of gender on the role of information technology in enhancing intellectual security varies across different academic levels and specializations. The post-hoc test results showed that: a. Gender had a significant effect on the role of information technology in enhancing intellectual security. Specifically, females had a significantly higher mean score than males. b. Specialization also had a significant effect, with students in scientific specializations having a higher mean score compared to those in humanities specializations. c. Academic level had a significant impact on the role of information technology in enhancing intellectual security. The post-hoc analysis revealed that first-year students had the lowest mean score, while third-year students had the highest mean score. The obtained results provide valuable insights into how the role of information technology in enhancing intellectual security is influenced by gender, specialization, and academic level.

Conclusion

This study has provided valuable insights into the role of information technology in enhancing intellectual security among university students in Jordan. It has also examined the influence of demographic variables such as gender, specialization, and academic level on this relationship. The findings highlight the importance of information technology in fostering an intellectually secure learning environment for university students. Results from this study indicate that information technology plays a significant role in enhancing intellectual security among Jordanian university students. The analysis revealed differences in the use and application of information technology based on gender and academic level. Female students and those at higher academic levels demonstrated a greater understanding and application of information technology for intellectual security purposes. However, no significant differences were observed between students from scientific and humanities specializations. These findings have practical implications for educators, policymakers, and higher education institutions in Jordan and beyond. It is essential to integrate information technology into curricula and develop educational strategies that promote intellectual security among students. Fostering a safe and secure learning environment helps students develop critical thinking skills, maintain academic integrity, and contribute to the overall stability of society. Nevertheless, the integration of IT is not without challenges. As highlighted, universities must remain vigilant against potential risks, ensuring a protective shield for their students in the digital realm. This involves both technological and educational measures.

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