

From Chalkboards to Smart Classrooms: Faculty Perceptions of IoT Integration in Jordanian Universities

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Abstract: Digital transformation in higher education has increased interest in faculty adoption of emerging technologies such as the Internet of Things (IoT). This study investigates faculty perceptions of IoT integration in Jordanian private universities, with particular attention to gender and academic rank. Grounded in the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), the study examines how key acceptance constructs shape IoT adoption in teaching. A quantitative, descriptive survey design was employed using a validated 21-item questionnaire administered to 350 full-time faculty members at Al-Zaytoonah University of Jordan. The instrument demonstrated strong reliability (Cronbach's $\alpha = 0.91$) and sound construct validity confirmed through confirmatory factor analysis (CFI = 0.95, RMSEA = 0.06). Results indicated a high overall level of acceptance of IoT applications in teaching (M = 4.12, SD = 0.88). No statistically significant differences were found by gender, while small but statistically significant differences emerged by academic rank, with assistant and associate professors reporting more positive perceptions than full professors ($\eta^2 = 0.024$). The findings suggest that IoT acceptance is broadly shared among faculty, with academic rank functioning as a modest, context-dependent moderator. The study contributes empirical evidence on IoT-enabled e-learning practices in Middle Eastern private higher education and highlights the need for targeted professional development and institutional support strategies.

Keywords: Internet of things (IoT), Faculty perceptions, Academic rank, Technology adoption, Jordan

1. Introduction

Technology has brought great changes to the global education sector, as it has transformed how we teach, assess and learn. One of the key technological achievements that emerges from this process is the Internet of Things, whose physical and digital worlds are “networked to allow numerous devices and sensors to interact with and access a variety of systems and data”. In addition, this leads to further deployment of smart classrooms, real-time assessment, enhanced communication, and other spaces, improving the educational landscape of universities (Villegas-Ch, Palacios-Pacheco, & Román-Cañizares, 2020). In part, this is the reason why to compete in the labor market and the future of work (Mershad & Wakim, 2018).

Having faculty members who are able to implement and deploy IoT in all universities will be key. It thus influences the perceived utility of technology and its sustained use for further learning. This extends to Technology Adoption Models such as TAM or UTAUT in which the effect of perceived usefulness, perceived ease of use and social influences on technology acceptance are studied (Venkatesh et al., 2003). These constructions exist at the level of higher education through the “institutional culture, professional norms, and organizational expectations...which affect faculty involvement with teaching technologies” (Davis, 1989). They also represent impacts on the core adoption constructs, individual differences, and other factors Gender and rank might also play a role in faculty perception about how useful IoT will be to teach their respective courses, and in the effort, they put into using IoT for teaching.

A few studies on IoT in education have been conducted in the Middle East and elsewhere. In this regard, for example, El-Dahshan (2019) observed some favorable attitudes among faculty toward the IoT in Egypt and Al-

Ma'mari et al. (2019) reported on the willingness of participating faculty members to integrate IoT at Sultan Qaboos University in Oman. In the same way, at an international level, it has been found that academics see IoT as useful for administrative efficiency and instructional support (Villegas-Ch, Palacios-Pacheco, & Román-Cañizares, 2020) Yet little is known about faculty attitudes in Jordan towards the use of IoT – especially that of private universities, which are increasingly influential actors in making higher education more accessible. Private universities in Jordan do not have the public authority of their public counterparts, but instead function within a more market-based environment, pitted against one another for students and with limited resources at their disposal. This and the subsequent section are because at the end of the day, in the context of Jordan, the private HEIs are an immensely important and unique place to study the adoption of technology because of the levels of competition and resources available to these universities.

On top of that, the analyses of socio-demographic data—gender or academic rank—should be taken into account when employing these theoretical assumptions. For instance, under UTAUT, gender is noted to modulate social influence and behavioral intention, so it could be investigated in other cultures. Grades may also be a measure of education and experience with facilitating conditions, like institutional support and training. Several senior faculties have more established teaching and incentive structures that ultimately affect their effort expectancy and performance expectancy. Although previous studies did not indicate any significant gender differences in the use of educational technology, equity and access remain important factors in higher education. Higher education is just as important; some international studies do not find any differences in rank between instructors (Mershad & Wakim, 2018). But new research has suggested that higher-level faculty are more likely to adopt digital technologies due to enhanced ICT training and digital education. Sprenger and Schwaninger (2021), for example, stated that perceived usefulness and ease of use constituted most acceptance of digital learning tools. Such findings show the role of individual and institutional factors in adoption behaviors.

Despite international research expanding rapidly, empirical evidence regarding faculty understandings of IoT adoption in private universities in Jordan is absent. This gap challenges the international models of technology acceptance in higher education in Jordan.

The study aims to two major ends: to first look to how faculty perceive IoT applications in university teaching and how they are useful in learning and in academics. Second, to understand how the perceptions differ according to gender and level of instruction, exploring how they are moderated by the variables, as suggested by the accepted model of technology acceptance, and how personal and professional characteristics affect faculty's use of new technologies.

RQ1: What are the perceptions of faculty members in Jordanian private universities toward the use of IoT applications in university teaching?

RQ2: Are there statistically significant differences in these perceptions attributable to gender and academic rank?

This is a theoretical and practical study which has of great value. It theoretically applies TAM and UTAUT into a context underexplored at the institutional and regional level via gender and academic rank as moderating variables. In practice, this information can be used to inform faculty development efforts, institutional ICT policy and formulate a plan for digital transformation at Jordan's private higher education.

2. Literature Review

In this review I have analyzed the major theoretical models of technology adoption, the perceived utility and simplicity of IoT, gender and rank, and identified the research gap in Jordanian private universities.

2.1 Theoretical Foundations: TAM and UTAUT in Educational Technology

The underlying idea of this study follows two leading models of technology acceptance. First, the TAM, which argues that the intention to use a technology is based mostly on two things: perceived usefulness (the extent to which someone thinks that the application of a system will improve their performance) and perceived ease of use (the extent to which people think that the application of a system will be effort-free) (Davis, 1989). Building on TAM, the Unified Theory of Acceptance and Use of Technology UTAUT considers four direct factors related to intention and use: performance expectancy; effort expectancy; social influence; and facilitating conditions (Venkatesh et al., 2003). UTAUT also notes that the strength of these relationships is influenced by the individual traits of gender and experience, such as in a context of technology acceptance.

These models are especially relevant to higher education, because faculty decision-making emerges within institutional culture, professional practices and organizational expectations, providing an attractive way of investigating IoT integration in university instruction. in university instruction.

2.2 Perceived Usefulness and Applications of IoT in Education

The perceived benefits of the Internet of Things in higher education have been explored in many ways. As with many studies, IoT provides access to smart classrooms, interactive learning environments, and real-time feedback systems to provide individual and flexible instruction (Jayousi et al. 2025; Alaklabi, 2019). Not only in teaching, but also IoT has been linked to better communication, coordination, and administration at universities (Shihao, Dahnil, & Saad, 2025; Suster et al. 2025).

Matar Al-Salmi, Abdullah, and Al-Hinai (2020) explored the impact of IoT in allowing for management of learning and how this technology could change the way information is stored, used in schools. Like IoT applications, IoT applications have been associated with improved academic support services, such as access to library resources and digital infrastructures (Saha & Roknuzzaman, 2024). International reports support these results Villegas-Ch, Palacios-Pacheco, and Román-Cañizares (2020) found that Ecuadorian faculty perceived the value of IoT to improve administrative efficiency and Mershad and Wakim (2018) found that IoT enhanced students' flexibility and teaching time.

Recently, studies suggest that experiential and practical experiences with IoT technologies can also have an effect on acceptance among teachers and students, particularly as IoT is embedded in instruction (Varela-Aldás et al. 2025). In addition, Abdelhamid (2021) found that smart learning environments built on IoT supported smart learning systems were especially helpful in improving digital literacy and student-teacher understanding of technology. A second key component of the adoption of IoT is perceived to be utility, but embodies classroom integration, not technological availability.

2.3 Perceived Ease of Use and Barriers to IoT Adoption

While IoT benefits are great, costs and effort remain barriers to adoption and the effects of international and country-specific research experience often diminish perceived ease of use, practical challenges are also preventing people from being able to easily access the Internet. Barriers include privacy and data security issues, limited infrastructure, high implementation costs and poor institutional training (El-Dahshan, 2019; Al-Ma'mari et al., 2019). Further, IoT requires that institutions handle large volumes of data, making for further complications of knowledge management systems and organizational readiness (Matar Al-Salmi, Abdullah, & Al-Hinai, 2020).

Study after study finds that perceived utility is highly correlated with persistent implementation barriers. For example, in Oman, strong faculty motivation and infrastructure issues are found (Al-Ma'mari et al., 2019); in Saudi Arabia, usability, institutional support, and security concerns are found to be top reasons for adoption (Ali, Syed, & Danish, 2023). Also, research from developing countries points out that institutional readiness and facilitators are the most important factors critical for IoT adoption (Madni et al., 2022). These findings indicate that ease of use is not just a technical problem but a systemic problem, driven by organizational support and policy.

2.4 The Role of External Variables: Gender and Academic Rank in Technology Adoption

Although the main constructs of TAM and UTAUT are universally applicable, they also provide insights into. Gender and class are contextual factors of technology adoption that should be examined more closely in higher education.

Gender. In the UTAUT model gender is involved in modulating the link between social power, effort expectancy, and behavioral intent. The empirical results are mixed. Although some studies do not reveal significant gender differences in the perception of technology when access and support are equitable (Villegas-Ch, Palacios-Pacheco, & Román-Cañizares, 2020). Nonetheless, given the persistent challenges to equity and digital inclusion within Middle Eastern higher education, exploring gender has less philosophical meaning than it should.

Academic rank. A higher level of education may provide a measure of age, experience, and learning of new instructional practices. However, new research suggests that recent ICT training and higher support for teaching innovation can lead junior faculty toward digital adoption (Ali, Syed, & Danish, 2023). Conversely, senior faculty might depend on established teaching practices and have their own professional incentive structures. Nevertheless, the findings are undoubtedly inconsistent; Mershad and Wakim (2018) reported no rank

difference between U.S. institutions. These contradictions suggest that the role of academic rank has an integral contextual dimension and is mediated by institutional culture, policy making, and available resources. Academic Status. The higher education level may provide a measure of age, learning, and experiences with new instructional practices. But new research suggests that recent ICT training and higher support for teaching innovation can lead junior faculty toward digital adoption (Ali, Syed, & Danish, 2023). The senior faculty, on the other hand, may use established teaching practices and have their own professional incentives. But the results were clearly inconsistent; Mershad and Wakim (2018) reported no difference in rank between U.S. institutions. These contrasts show that the influence of professorship is highly contextual and dependent upon institutional culture, governance system, and available resources.

2.5 Synthesis and Identified Research Gap

The literature supports TAM and UTAUT as an effective model for the study of IoT adoption with perceived utility and ease of use being cited as main factors. Few studies have examined the relationship between demographic and institutional context in defining adoption, particularly in private Jordanian universities. These institutions have competitive market pressures and resource constraints and a unique circumstances under which technology is used.

This clarifies what should be done in terms of empirical research regarding the perception of faculty regarding the adoption of IoT across gender and class in private education in Jordan. This gap provides context for discussion and for regional scholarship and further discourse regarding the limits of universal models of technology acceptance.

3. Methodology

This study employed a quantitative, descriptive survey design to investigate faculty perceptions of IoT applications in teaching at Al-Zaytoonah University of Jordan, a representative private university in Jordan. The study was conducted during the second semester of the 2023/2024 academic year and was limited to full-time faculty members. Although the single-institution design limits generalizability, it was selected to allow for a deep, controlled examination of the institutional culture and demographic variables within a defined setting, providing a robust case study for the Jordanian private higher education sector. The scope of the study is therefore bounded by this institutional and temporal context. Other limitations, including the use of self-reported data and the cross-sectional design, are discussed in a later section.

3.1 Research Design

The descriptive, quantitative survey design was used because it is well suited to analyzing attitudes and perceptions over a particular population at a given point in time (Creswell & Creswell, 2018). This design provides a means of rigorously examining faculty perceptions and demographic group comparisons, as well as consistent with the methodology commonly used in technology acceptance studies (Madni et al., 2022; Ali, Syed, & Danish, 2023). There were no directional hypotheses, but the study follows an analytical logic based on theory based on TAM and UTAUT that looks at gender and rank as moderating variables that may change faculty perceptions of IoT adoption.

Figure 1 presents the conceptual model of the study, illustrating the theoretical framework grounded in TAM and UTAUT and the role of gender and academic rank as contextual moderating variables influencing faculty perceptions of IoT adoption in teaching.

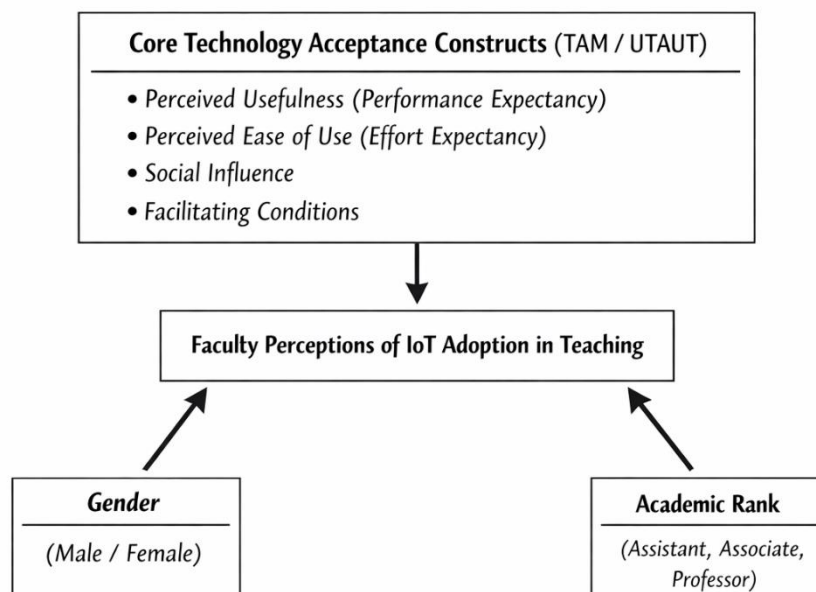


Figure 1: Conceptual model of faculty perceptions of IoT adoption based on TAM and UTAUT

3.2 Population and Sample

All 741 full-time faculty members were included in the study population at Al-Zaytoonah University of Jordan.

Generally, a minimum representative sample size of 253 was recommended in Krejcie and Morgan (1970) table.

To provide sufficient statistical strength and to minimize of non-response bias, a higher number of questionnaires were distributed.

- Distribution: A total of 357 questionnaires were distributed: 304 in paper format and 53 online via Google Forms.
- Collection and Exclusion: All 304 paper questionnaires were returned. Four were excluded due to extensive missing data, yielding 300 valid paper responses. All 53 online responses were collected; three were excluded for the same reason, yielding 50 valid online responses.
- Final Sample: The final valid sample for analysis was therefore N = 350 faculty members. The demographic distribution is presented in Table 1.

Table 1: Distribution of the Study Sample by Gender and Academic Rank (N = 350)

Variable	Category	n	%
Gender	Male	211	60%
	Female	139	40%
Academic rank	Professor	114	33%
	Associate Professor	126	36%
	Assistant Professor	110	31%

3.3 Instrument Development and Description

A structured questionnaire was developed to assess faculty perceptions based on the core constructs of the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). The initial 25-item pool was generated through a review of the literature on IoT adoption in higher education (e.g., Abdelhamid, 2021; Madni et al., 2022). The final instrument operationalized four theoretical constructs:

Perceived Usefulness / Performance Expectancy (6 items)

Perceived Ease of Use / Effort Expectancy (5 items)

Social Influence (4 items)

Facilitating Conditions (6 items)

Content and face validity were established through expert review by eight specialists in educational technology and measurement. Based on their feedback, four overlapping items were removed, resulting in a final instrument of 21 items. Responses were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.4 Validity and Reliability

They conducted a small-scale research project with 60 faculty members in order to evaluate their psychometric properties. Construct Validity: Confirmatory Factor Analysis (CFA) showed the proposed four-factor structure. The model fit indices were excellent: $\chi^2/df = 2.15$, CFI = 0.95, TLI = 0.93, RMSEA = 0.06, and SRMR = 0.04, all meeting thresholds for good fit (Hu & Bentler, 1999).

Standardized factor loadings for all items were in the range of 0.63 to 0.87, exceeding the minimum recommended of 0.60, suggesting strong convergent validity at the item level. No item had cross-loadings or weak structural relationships to the intended construction and all loadings were statistically significant ($p > .001$).

For each construct, convergent validity was further tested with (AVE) and (CR). The AVE values were 0.54–0.86 exceeding the desired cutoff of 0.50, and the CR values were 0.83–0.91 higher than the suggested cutoff of 0.70. This reveals a significant component of the variance in indicators within each construct.

The discriminant validity was assessed with the Fornell–Larcker criterion. This is explained by an observation that AVE is larger than the inter-construct correlation coefficients for all constructs so that each construct is distinct and reflects a different dimension of faculty perception of IoT adoption.

The Cronbach's alpha of the instrument was 0.91, showing strong internal consistency. The subscales also showed strong reliability: Perceived Usefulness ($\alpha = .88$), Perceived Ease of Use ($\alpha = .85$), Social Influence ($\alpha = .82$), and Facilitating Conditions ($\alpha = .87$). The correlation coefficient for the test-retest reliability was 0.89 within two weeks, which indicated a strong correlation ($p < .001$).

3.5 Operationalization of Variables

While gender, female and class, were independent variables, male and female variables were both employed. assistant, associate and full professor variables. Academic rank was also viewed as an indicator of professional prestige and affiliation, instead of age or experience. In this case age or training did not matter, as explained in the discussion section.

3.6 Ethical Considerations

Participation was voluntary and an overview was given to each participant before data collection to clearly articulate the purpose of the study. Informed Consent was obtained with strict confidentiality and anonymity. Reporting was done in aggregate.

3.7 Procedures and Bias Mitigation

Data collection was conducted according to a systematic format. Independent-sample t-tests between early and late respondents were used to test for bias by non-response bias and no significant differences were observed ($p > .05$). Procedural remedies were used to limit common method bias, such as assurance of anonymity and reverse-coded items. Statistically, Harman's one factor test found that no single factor contributed to the majority of variance (38.2%), but well below the 50% recommended limit.

3.8 Statistical Analysis

All data was used for analysis with SPSS v27 and AMOS v24. Research Question 1 was assessed using descriptive statistics (means, standard deviations, and confidence intervals). We conducted independent-samples t-tests for gender differences and one-way ANOVA using Tukey's HSD post hoc tests to test for gender differences. The effects sizes, Cohen's d and eta squared, were reported in systematic ways to supplement the statistical significance testing and make it more interpretable, as required in educational research.

4. Results and Findings

The findings are presented as three sections: perceptions of IoT applications among faculty; gendered and rank-based variations; and summary of the findings.

4.1 Research Question 1: Faculty Perceptions of IoT Applications

Descriptive statistics were then used to measure the general perception of faculty members regarding IoT applications in higher education teaching. Table 2 shows that faculty members reported a high level of positive perception overall, with a mean score of $M = 4.12$ ($SD = 0.88$) on a 5-point Likert scale. Additionally, the 95% confidence interval of [4.04, 4.20] indicates that the population mean is in the upper agreement range, which implies that IoT is a strongly supported teaching practice.

It found the highest mean scores for statements on IoT's role in real-time student assessment (Item 21, $M = 4.47$), enhanced instruction through multimedia (Item 19, $M = 4.46$), and traditional teaching methodologies (Item 20, $M = 4.44$). These items are reflective of IoT's perceived instructional value and pedagogical utility, not technology's singular appeal.

Table 2: Faculty Members' Perceptions of IoT Applications in University Teaching (N = 350)

Rank	Item No.	Item Statement	Mean	SD	95% CI	Perception Degree
1	21	IoT enables teachers to measure students' learning progress in real time.	4.47	0.91	[4.37, 4.57]	Very High
2	19	IoT can be used to teach a wide range of subjects using graphics and animations to enhance understanding.	4.46	1.02	[4.34, 4.58]	Very High
3	20	IoT allows for a transformation from traditional to digital teaching methodologies, with increased efficiency.	4.44	0.79	[4.34, 4.54]	Very High
4	18	IoT devices provide reliable access to educational materials and communication channels.	4.41	0.89	[4.30, 4.52]	High
5	15	IoT contributes to scientific research and the formation of research collaboration groups.	4.40	0.75	[4.32, 4.48]	High
6	16	IoT provides diverse teaching methods.	4.38	0.88	[4.28, 4.48]	High
7	17	IoT helps simplify the explanation of concepts and link experiences to simulated reality.	4.36	0.89	[4.26, 4.46]	High
8	10	IoT saves instructors' time through faster attendance registration and assignment collection.	4.32	0.81	[4.23, 4.41]	High
9	14	IoT strengthens student-teacher connections through direct communication in virtual classrooms.	4.30	0.99	[4.19, 4.41]	High
10	13	IoT assists in students' comprehension by diversifying instructional strategies.	4.28	0.76	[4.20, 4.36]	High
11	12	Adequate infrastructure for IoT facilitates the teaching-learning process.	4.25	0.92	[4.15, 4.35]	High
12	11	The use of IoT applications is easy and straightforward.	4.22	0.85	[4.13, 4.31]	High
13	1	IoT reduces burdens on students.	4.21	1.00	[4.10, 4.32]	High
14	5	IoT use does not pose fears of security breaches, surveillance, or similar threats.	4.20	0.92	[4.10, 4.30]	High
15	4	IoT use leads to comprehensive experience with the latest technologies.	4.12	0.78	[4.04, 4.20]	High
16	3	IoT provides empowering tools to access organizational and technological knowledge.	4.10	0.82	[4.02, 4.18]	High
17	2	IoT use develops new skills and competencies in information technology.	4.01	0.91	[3.91, 4.11]	High
18	6	IoT supports innovation and reduces process execution time.	3.89	0.93	[3.79, 3.99]	Moderate
19	9	IoT provides a rich and flexible platform to explore learning in an intelligent environment.	3.88	0.85	[3.79, 3.97]	Moderate
20	8	IoT helps eliminate repetitive daily tasks and focus on more important matters.	3.84	1.00	[3.73, 3.95]	Moderate

Rank	Item No.	Item Statement	Mean	SD	95% CI	Perception Degree
21	7	IoT supports learning anytime and anywhere.	3.74	0.92	[3.63, 3.85]	Moderate
		Overall Perception	4.12	0.88	[4.04, 4.20]	High

Note. CI = Confidence Interval. Scale range = 1 (strongly disagree) to 5 (strongly agree).

4.2 Research Question 2: Differences by Gender and Academic Rank

4.2.1 Gender differences

In order to compare the perceptions of female and male faculty members, a t-test using independent-samples was undertaken. As reported in Table 3, there was no statistically significant difference in faculty perception between males and females, $t(348) = 1.18$, $p = .24$. Cohen's d calculated the effect size as 0.13 and therefore extremely small. This result indicates that gender is not at all involved in the difference between faculty's perceptions of IoT adoption.

Table 3: Independent-Samples t-Test for Gender Differences in Perceptions

Gender	n	M	SD	t(348)	p	Cohen's d	95% CI (diff)
Male	211	53.28	7.00	1.18	.24	0.13	[-0.09, 0.35]
Female	139	52.11	6.84				

4.2.2 Differences by academic rank

To examine variations in how faculty groups perceive their institutions, a one-way analysis of variance was used to compare faculty views across academic rank. A statistically significant differentiation between the ranks was found, $F(2,347) = 4.27$, $p = .015$, $\eta^2 = .024$ (see Table 4). The large sample size may contribute to that this value is statistically significant, although this effect size is so small that it is likely meaningless in practical terms.

Table 4: One-Way ANOVA for Perceptions by Academic Rank

Source	SS	df	MS	F	p	η^2
Between groups	321.25	2	160.63	4.27	.015	0.024
Within groups	13,020.6	347	37.52			
Total	13,341.9	349				

This small effect size suggests that academic rank is a statistically significant but practically insignificant factor in explaining differences in faculty attitudes toward IoT adoption.

To determine the source of these differences, after the fact comparisons were performed using Tukey's HSD test (Table 5).

Table 5: Tukey Post Hoc Comparisons of Academic Rank

Comparison	Mean Diff.	p	95% CI
Professor – Associate Prof.	-0.26	.09	[-0.56, 0.04]
Professor – Assistant Prof.	-0.30*	.03	[-0.58, -0.02]
Associate – Assistant Prof.	-0.56*	.00	[-0.85, -0.27]

Post hoc estimates indicated that assistant professors scored far higher on positive perception than full professors ($p = .03$) and associate professors ($p < .001$) and were not statistically significant in comparison to professors and associate professors ($p = .09$). The differences in mean were small, though statistically significant, and support the notion that academic rank serves as a secondary rather than a major influence on perceptions.

In other words, the mean is 0.30 to 0.56 on the 5-point scale, indicating relatively little similarity in practical instruction across faculty.

4.3 Summary of Findings

In general, the faculty indicated that they were embracing IoT applications in their teaching practice. Gender-related differences were insignificant, although significant differences were observed across academic rank. Importantly, these rank-based differences were minor effects, suggesting that academic rank is only one of many factors that interact with faculty perceptions rather than being the main driver.

5. Discussion

These findings directly address the first research question on faculty's perceptions of IoT in teaching. Faculty at private Jordanian universities shared broadly positive sentiment, with scores particularly high on IoT's effectiveness in making real-time assessments of students, regarding resources and in changing teaching practices. These findings are consistent with other studies indicating that IoT enhances school efficiency, instructional flexibility and higher learning outcomes (Abdelhamid, 2021; El-Dahshan, 2019; Mershad & Wakim, 2018). Importantly, the consistently high mean scores across items suggest not a specific acceptance of a particular tool, but a wider perception of IoT as a teaching paradigm rather than as a supplementary technology. The benefits reported are strongly associated with the core constructs of Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). High levels of perceived usefulness (performance expectancy) and manageable effort expectancy indicate that faculty interpret IoT as contributing to teaching effectiveness without too much cognitive or technical pressure (Venkatesh et al., 2003). This balance of perceived effort with anticipated performance improvement seems essential for acceptance of private universities with IoT in financial constraints, and with instructional efficiency at the heart of resource-constrained private colleges in the cloud. These results converge with Sprenger and Schwaninger (2021), who found that perceived usefulness and ease of use influence adoption goals across digital learning technologies. Also found was an answer to the second question the study, demographic differences. This finding corroborates prior research that based on a similar combination of access, infrastructure, and institutional support, technology is increasingly gender-neutral in higher education (Villegas-Ch, Palacios-Pacheco, & Román-Cañizares, 2020). This result suggests that social influence and the supportive conditions of employment at UTAUT are similar to those of male and female faculty in Jordanian private universities, reflecting progress toward more equitable institutional engagement with digital resources over gendered adoption.

By contrast, the statistically significant, but almost invisible difference in academic rank was the difference between assistant and associate professors, both of whom expressed greater positive views than full professors. The small effect size ($\eta^2 = 0.024$) indicates that school rank accounts for a tiny proportion of variance in IoT perceptions, and thus rank is not a dominant factor in adoption attitudes. But, if the difference is statistically significant, it should be contextualized rather than dismissed.

Junior teachers may have more favorable perceptions in terms of the performance expectancy of assessment, student learning, and job recruitment requirements. Rather than being solely generational, these findings are more readily understood through professional incentives and institutional role expectations. Assistant professors, particularly, are more inclined to use new instructional methods, and associate professors may blend teaching with promotion-related needs. Full professors, on the other hand, can operate on more stable professional routes that diminish the perceived marginal gain associated with using new instructional technologies, even with institutional support.

These patterns may also reflect differences in the facilitation conditions. Higher teachers' workload for junior faculty may contribute to increased perceived value for IoT tools that improve assessment, communication, and instructional management, thus improving effort expectancy by integrating performance with effort. On top of that, professors who have received doctoral training in rapid ICT integration are more likely to have taught digital classes and to be less stressed when IoT adoption is evident.

The presence of rank-based differences is not consistent with those found in other institutional settings (Al-Ma'mari et al., 2019; Mershad & Wakim, 2018), which suggests that institutional context is the important moderator for technology acceptance. In private Jordanian institutions, pressures created by market forces, performance-based assessment systems, and student satisfaction may further strengthen the perceived instructional value of IoT for faculty members actively developing or integrating their profiles. This contextual sensitivity further demonstrates the limitations of treating these models of technology acceptance as uniformly applicable across institutional domains.

Interpretation of these results should be accompanied by several limitations. The study was conducted at one private university, which limited generalizability. This approach may result in response bias from the self-

reported perceptions and longitudinal aspects in adoption attitudes cannot be examined because the design is cross-sectional. Furthermore, academic rank was used as a measure of professional experience and career stage without explicit measures of age, teaching load or research expectations. Future studies should adopt mixed-methods, incorporate behavioral characteristics of IoT use and look at multiple institutional structures in order to better understand the mechanisms underlying demographic differences in technology acceptance.

6. Conclusion

The purpose of this study was to understand the perceptions of university personnel toward the implementation of the IoT at private Jordanian universities and how they differ across gender and socioeconomic status. The results suggest that the impact of IoT is strongly acknowledged by faculty as facilitating effectiveness of teaching, student participation, and instructional support. This lack of gender-based differences reflects a similar level of access to and willingness to use digital technologies among faculty. While statistically significant differences by academic rank were found, their practical magnitude was negligible, suggesting that rank is more a contextual rather than a primary determinant of IoT acceptance. More specifically, associate and assistant professors had more positive perceptions than full professors; however, the small effect size suggests that academic rank is one of several relationships that influence attitudes about technology.

The primary outcome of this study is to show the influence of institutional context on technology acceptance. In the private universities of Jordan with market-driven governance and variable allocations of resources, academic rank seems to be intertwined with professional expectations and incentives, thus producing minor differences in faculty perceptions. This contradicts data in other national and institutional settings, and illustrates the context-sensitive nature of models of technology acceptance. Therefore, their research presents TAM and UTAUT as reflecting the nature of core constructs in local institutional bodies rather than a universally invariant system.

This study has academic and policy implications. If IoT integration is effective, it must be coordinated across institutions, not one faculty effort at a time. In the university, for instance, structured peer-mentoring may be possible, for instance, for sharing knowledge at all stages of a career. At policy level, the systemic involvement of digital pedagogy and IoT readiness in quality assurance and accreditation could encourage further adoption. Furthermore, faculty development programs should be shifted to support senior staff through training, innovation grants or teacher load adjustment so that the small difference in rank considered in this study is not considered in the programs.

There are a few limitations. This is not the single private university that is difficult to generalize, and there is no use for cross-sectional data for causal inference. Future research studies in this area should be conducted in mixed methods and longitudinal studies designed to evaluate the impact professional experience, educational burden, and institutional incentives can have on technology adoption over time. Comparisons between public and private universities and national government would further show how governance and resource structures are linked.

Finally, this paper reflects the prevalence of high levels of acceptance of IoT at private Jordanian universities and has some observations on small contextual variation regarding the relationship between ranking and status. In addition, in considering demographics and institutional context, this study provides new insight into a more complex literature on technology acceptance and offers useful insights for education policy and practice for the development of higher education systems.

To conclude, this study provides empirical evidence for significant faculty acceptance of IoT in Jordanian private universities, but presents minor, contextually dependent variation relative to rank. The study, which integrates demographic context with institutional context, provides a new perspective on the literature in acceptance of technology and provides useful insights into educational policies and practice regarding improving the higher education system.

Conflict of Interest: The authors acknowledge that any commercial, financial or personal relationships that could be seen as possible conflicts of interest with respect to performance or publication of this study are irrelevant.

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