ISSN: 2457-0400

Impact Factor: 7.675

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 8

Page N. 147-154

Year: 2026

Original Article

Coden USA: WJAMA3

EXPLORING MEDICAL STUDENTS' KNOWLEDGE AND UTILIZATION OF ELECTRONIC-HEALTH AND DIGITAL MEDICAL RESOURCES IN MOSUL CITY

***Hiba Hani Saadoon, Dr. Shaimaa Salim Hussain**

*M.B.Ch.B.
M.B.Ch.B./F.I.C.M.S(FM)

Article Received: 24 June 2026 **Article Revised: 14 July 2026** **Article Published: 01 August 2026**

***Corresponding Author: Hiba Hani Saadoon**

M.B.Ch.B.

DOI: https://doi.org/10.5281/zenodo.21702738

How to cite this Article: *Hiba Hani Saadoon, Dr. Shaimaa Salim Hussain (2026). Exploring Medical Students' Knowledge And Utilization Of Electronic-Health And Digital Medical Resources In Mosul City. World Journal of Advance Healthcare Research, 10(8), 147–154.

This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

Background: The integration of electronic health (e-health) and digital medical resources into medical education has transformed healthcare delivery and training, yet awareness, usage, and challenges surrounding their adoption among medical students, particularly in low- and middle-income countries, remain underexplored. **Aim:** This study aimed to explore the knowledge, attitudes, and practices of undergraduate medical students in Mosul City regarding e-health applications and digital medical resources, and to describe demographic characteristics, digital-resource preferences, and curriculum adequacy for future healthcare digitalization. **Methods:** An analytical cross-sectional study was conducted among 328 undergraduate medical students from the University of Mosul and Ninevah College of Medicine, Iraq, using a structured self-administered online questionnaire. Data were analyzed using IBM SPSS software, and ethical approval was obtained from the Directorate of Health in Nineveh and the Local Scientific Council of the Arab Board of Health Specializations in Family Medicine. **Results:** Most students demonstrated good-to-very-good digital competence. Male students reported significantly higher levels of digital expertise than female students ($\chi^2 = 21.375$, df = 4, $p < 0.001$). Tablets (84.1%) were the most commonly used learning device, and 86.6% of students reported using artificial intelligence tools. In contrast, advanced medical platforms such as Medscape (7.6%) and UpToDate (2.1%) were rarely used. The mean knowledge score was 3.93 ± 1.126 (out of 6). The most frequently reported barriers to e-health adoption were inadequate training (57.3%), privacy and security concerns (45.1%), and resistance to change (43.0%). Knowledge, attitude, and expertise scores were positively correlated (all $p < 0.01$). **Conclusion:** Medical students in Mosul and Ninevah possess strong familiarity with e-learning technology, but limited knowledge of e-health applications, especially remote consultation; curriculum integration of e-health modules, structured digital-training programmes, and stronger attention to data-privacy safeguards are recommended.

KEYWORDS: e-health; digital medical resources; medical education; telemedicine; digital literacy; barriers to adoption; privacy concerns; medical curriculum; Iraq.

1. INTRODUCTION

Electronic health (e-health) and digital medical resources are broadly defined as sources pertaining to public health and medicine accessed via electronic or digital platforms.[1] The World Health Organization promotes digital technologies to facilitate access to health services, enhance quality of care, and reduce costs, while low- and middle-income countries are increasingly shifting toward online medical resources to offset physician shortages and infrastructural gaps.[2,3]

Digital medical resources facilitate patient care, medical education, and research by offering dynamic, continuously updated content in place of static, paper-based literature. Benefits include improved access to current scientific information, enhanced multimedia-based learning, and facilitation of remote consultations through telemedicine, which allows students to develop competence in initiating and conducting video consultations.[4,5,6]

Nonetheless, unequal access to devices and connectivity, variable quality and reliability of online content, and privacy and security risks constitute recognised drawbacks of digital medical resources, and these risks have been amplified by the accelerated adoption of online healthcare services following the COVID-19 pandemic.[7,8]

Telemedicine, defined as healthcare delivery at a distance through electronic means, is expanding rapidly, and familiarity with it favourably shapes trainees' views of its utility; successful adoption depends on understanding user perceptions regarding the doctor-patient relationship, data privacy, and information reliability.[9] Integration of electronic devices into the educational experience, more broadly, is now considered essential for developing the digital skills required of future physicians.[10]

Despite growing global interest in digital-health readiness among trainees, awareness, usage patterns, and barriers to adoption of e-health and digital resources among medical students in low- and middle-income settings, including Iraq, remain insufficiently characterised. This study therefore aimed to explore the knowledge, attitudes, and practices of undergraduate medical students in Mosul City regarding e-health applications and digital medical resources, to describe their demographic characteristics, to explore their preferences for digital educational resources, and to assess the adequacy of the medical curriculum in preparing students for future healthcare digitalisation.

2. Subjects and Methods

2.1 Study design and setting

An analytical, cross-sectional study was conducted among students of the College of Medicine at the University of Mosul and the University of Ninevah, in Mosul City, northwest Iraq.

2.2 Study period and sample

Data were collected over five months, from February to July 2025. The study sample comprised 328 medical students from the two colleges, recruited through an anonymous, self-administered online (Google Forms) questionnaire.

2.3 Eligibility criteria

Eligible participants were current medical students at either college, of either sex, who consented to complete the questionnaire anonymously. Non-medical students, respondents with incomplete responses, and students with prior formal e-health training were excluded.

2.4 Ethical considerations

Administrative approval was obtained from the Directorate of Health in Nineveh (February 2025), and the study was approved by the Local Scientific Council of the Arab Board of Health Specializations in Family Medicine, Iraq. The aims and nature of the study were explained to all participants, and verbal informed consent was obtained; data confidentiality was maintained throughout.

2.5 Statistical analysis

Data were processed using IBM SPSS software (version 18). Categorical variables were summarised as numbers and percentages and compared using the Pearson chi-square test, including linear-by-linear association where appropriate; continuous knowledge scores were summarised as mean ± standard deviation. Correlations between knowledge, attitude, expertise, and satisfaction scores were assessed using Pearson correlation coefficients. A p-value <0.05 was considered statistically significant.

3. RESULTS

3.1 Sociodemographic characteristics

The 328 participating students were nearly evenly distributed between males (n=161, 49.1%) and females (n=167, 50.9%). Students from the University of Ninevah made up 55.2% (n=181) of the sample, compared with 44.8% (n=147) from the University of Mosul. The large majority (86.6%, n=284) resided in urban areas. The academic-year distribution was skewed toward early years, with first-year students forming the largest group (42.7%) and sixth-year students the smallest (4.9%) (Table 1); this should be considered when generalising the findings.

Table 1: Distribution of students according to study variables (N=328).

Variable	Number	Percentage
Sex	Male	Female
Male	161	49.1%
Female	167	50.9%
College		
University of Mosul	147	44.8%
University of Ninevah	181	55.2%
Residence		
Urban	284	86.6%
Suburban	22	6.7%
Rural	22	6.7%
Academic year		
1st year	140	42.7%
2nd year	70	21.3%
3rd year	48	14.6%
4th year	27	8.2%
5th year	27	8.2%
6th year	16	4.9%
Total	328	100%

3.2 Student IT expertise

Participants self-rated their digital expertise on a five-point scale: 0.9% weak, 12.2% acceptable, 36.6% good, 36.3% very good, and 14.3% excellent, indicating a predominantly digitally literate cohort. By sex, all students who rated themselves as “weak” were female, whereas males predominated in the “excellent” category

(10.67% of the total sample vs 3.66% for females). The Pearson chi-square test confirmed a statistically significant association between sex and self-reported expertise (chi-square=21.375, df=4, p<0.001; linear-by-linear association=11.945, p=0.001), indicating that males were more likely to report higher digital proficiency, although this may partly reflect differing self-assessment tendencies rather than an actual skill difference (Table 2).

Across academic years, descriptive proportions of expertise level shifted with a notable peak of excellent self-rating in the fifth year (33.3%); however, the chi-square test showed no statistically significant relationship between academic year and digital expertise (chi-square=17.096, df=20, p=0.647; linear-by-linear association p=0.061, borderline trend).

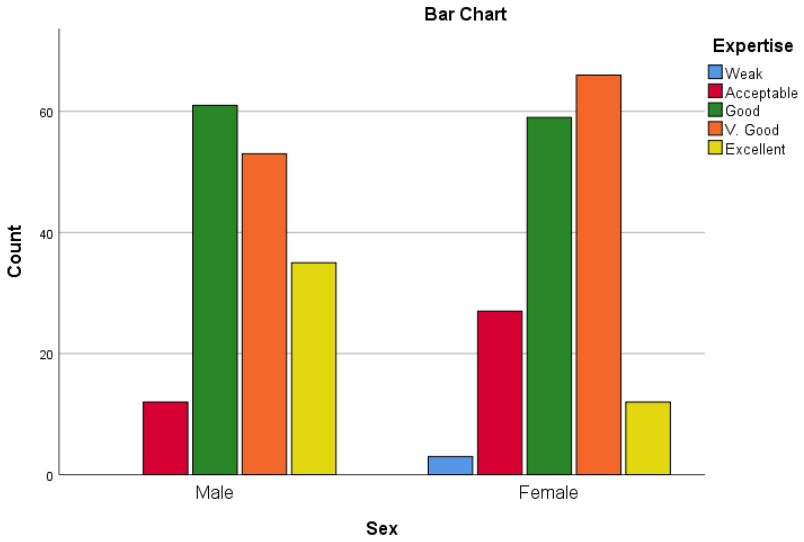

Figure 1: Student IT expertise between male and female students.

Table 2: Sex versus self-reported digital expertise (chi-square=21.375, df=4, p<0.001).

Sex versus Expertise Representation								
			Expertise					Total
			Weak	Acceptable	Good	V. Good	Excellent	
Sex	Male	Count	0	12	61	53	35	161
		% within Sex	0.00%	7.50%	37.90%	32.90%	21.70%	100%
		% within Total Expertise	0.00%	3.66%	18.60%	16.16%	10.67%	49%
		% within Expertise	0.00%	30.80%	50.80%	44.50%	74.50%	49%
	Female	Count	3	27	59	66	12	167
		% within Sex	1.80%	16.20%	35.30%	39.50%	7.20%	100%
		% within Total Expertise	0.9%	8.23%	17.99%	20.12%	3.66%	50.9%
		% within Expertise	100%	69.20%	49.20%	55.50%	25.50%	50.9%
Total		Count	3	39	120	119	47	328
		% within Sex	0.9%	11.90%	36.60%	36.30%	14.30%	100%
		% within Expertise	100%	100.00%	100.00%	100.00%	100.00%	100%

3.3 Electronic device preference

Tablets were the most commonly used learning device (84.1%), followed by smartphones (39.6%) and laptops (26.5%), suggesting that tablet-based learning predominates in this setting. Neither sex nor place of residence was significantly associated with device choice, although descriptive trends suggested somewhat lower laptop accessibility among students from villages.

3.4 Electronic resources and platforms

More than half of students used online learning resources (59.8%) and search engines (50.6%), and 65.2% practised self-teaching; Google Classroom was used by 90.5% of students, and artificial-intelligence tools by 86.6%. In contrast, advanced medical platforms had markedly lower uptake: Medscape 7.6%, UpToDate 2.1%, Lexicomp 0.9%, and Moodle 2.1%. None of the 18 platforms examined showed a significant sex difference in use. However, use of several platforms correlated significantly with self-reported IT expertise, most strongly for AI tools (chi-square=23.822, p<0.001) and Medscape (chi-square=19.765, p=0.001) (Table 3); UpToDate, Lexicomp, Google Classroom, Moodle, online courses, Lecturio, in-class teaching, and hybrid learning showed no significant association with expertise (all p>0.05).

Table 3: Platform utilisation and correlation with self-reported IT expertise.

Resource/Platform	Utilization %	Test statistic	p-value	Interpretation
Search engines	50.6%	linear-by-linear	0.040	More proficient students reported higher reliance
AI tools	86.6%	chi-square(4)=23.822	<0.001	Strong association with expertise
Medscape	7.6%	chi-square(4)=19.765	0.001	Positively skewed toward higher expertise
Masaaqat (local platform)	8.5%	chi-square(4)=12.898	0.012	Significant association with expertise
Self-teaching	65.2%	chi-square(4)=16.480	0.002	Favoured by higher-proficiency students
Online resources	59.8%	chi-square(4)=16.550	0.002	70.6% of very good/63.8% of excellent students used these

3.5 Internet usage purpose

Entertainment (28.7%) and e-medical education (28.4%) were the leading reasons for regular internet use, followed by social media (25.3%), finding educational resources (14.6%), and online work (3.0%). Usage purpose varied descriptively by academic year: e-medical education use peaked in third- and fifth-year students (35.4% and 37.0%, respectively), while entertainment peaked in sixth-year students (43.8%); however, the association between academic year and purpose of use was not statistically significant (chi-square=16.487, df=20, p=0.686). Urban students used the internet more for entertainment (31%) and e-medical education (27.5%), whereas residence-based differences overall were not statistically significant, though descriptive trends suggested reduced engagement among town and village residents.

3.6 Knowledge of e-learning and e-health

Most students (71.3%) correctly identified that e-learning depends on a digital environment to deliver curricula through electronic networks, and 88.4% recognised it as an interactive, distance-learning system. Digital multimedia capability was almost universally recognised (96.6%). However, only 22.0% correctly judged that e-learning in medicine is not necessarily less expensive than traditional learning, and only 37.8% accurately identified e-health as encompassing remote consultations and enquiry resolution without in-person visits, indicating a specific knowledge gap regarding the economic and clinical-service dimensions of e-health (Table 4). Overall knowledge scores (range 0-6) had a mean of 3.93 (SD 1.126), reflecting considerable variability (Figure 2).

Table 4: Distribution of students according to knowledge of e-learning and e-health.

Knowledge item	True	False	Unaware	Total
E-learning depends on a digital electronic environment	234 (71.3%)	7 (2.1%)	87 (26.5%)	328 (100%)
E-learning is an interactive distance-learning system	290 (88.4%)	14 (4.3%)	24 (7.3%)	328 (100%)
E-learning in medicine is not necessarily less expensive	72 (22.0%)	161 (49.1%)	95 (29.0%)	328 (100%)
E-learning provides multimedia content (text, audio, video, images)	317 (96.6%)	3 (0.9%)	8 (2.4%)	328 (100%)
E-health means flexible technology use without harming physical/visual health	251 (76.5%)	25 (7.6%)	52 (15.9%)	328 (100%)
E-health means remote consultations without in-person clinic visits	124 (37.8%)	111 (33.8%)	93 (28.4%)	328 (100%)

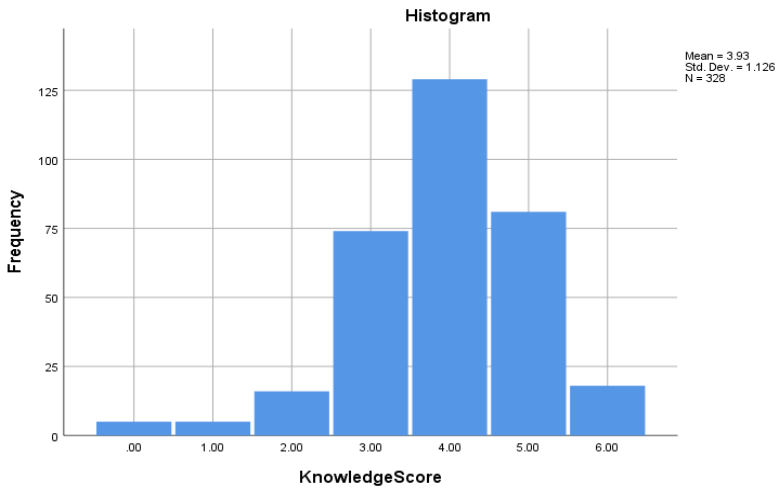

Figure 2: Distribution of knowledge scores for e-health (mean 3.93 ± SD 1.126).

3.7Attitudes toward e-learning and e-health

Perspectives combined cautious optimism with clear scepticism. Only 23.8% agreed that e-learning is applicable in Mosul City, while 38.4% disagreed; similarly, only 26.5% considered e-learning a viable substitute for traditional medical education, versus 47.5% disagreement. In contrast, 69.5% agreed that e-learning content can be sufficient to satisfy educational requirements, and 52.7% preferred downloadable content over live sessions. Confidence in the clinical utility of e-learning was low: only 21.1% agreed it could be used for clinical aspects of medicine, while 53.9% disagreed. Support for curriculum modernisation was strong (60.1% agreement), whereas only 18.6% believed electronic consultations could substitute for direct healthcare services (Table 5).

Table 5: Distribution of students according to attitudes toward e-learning and e-health (SA=strongly agree, A=agree, N=neutral, D=disagree, SD=strongly disagree).

Topic	SA	A	N	D	SD
E-learning is applicable in Mosul City	18 (5.5%)	60 (18.3%)	124 (37.8%)	84 (25.6%)	42 (12.8%)
E-learning is a possible substitute for traditional medical education	28 (8.5%)	59 (18.0%)	85 (25.9%)	68 (20.7%)	88 (26.8%)
E-learning content should be sufficient to satisfy educational requirements	107 (32.6%)	121 (36.9%)	57 (17.4%)	22 (6.7%)	21 (6.4%)
Downloadable content is better than live content	111 (33.8%)	62 (18.9%)	83 (25.3%)	40 (12.2%)	32 (9.8%)
Adherence to e-learning schedules should equal that of direct learning	114 (34.8%)	99 (30.2%)	63 (19.2%)	34 (10.4%)	18 (5.5%)
E-learning can be used for the clinical aspects of medicine	31 (9.5%)	38 (11.6%)	82 (25.0%)	66 (20.1%)	111 (33.8%)
E-learning is more convenient/flexible than traditional learning	64 (19.5%)	55 (16.8%)	106 (32.3%)	36 (11.0%)	67 (20.4%)
E-testing can replace traditional testing methods	61 (18.6%)	41 (12.5%)	82 (25.0%)	50 (15.2%)	94 (28.7%)
Interaction between students and lecturers is possible via e-learning	58 (17.7%)	83 (25.3%)	87 (26.5%)	54 (16.5%)	46 (14.0%)
A curriculum update is necessary to prepare graduates for e-health services	101 (30.8%)	96 (29.3%)	93 (28.4%)	22 (6.7%)	16 (4.9%)
Electronic health services could substitute for direct health services	24 (7.3%)	37 (11.3%)	102 (31.1%)	72 (22.0%)	93 (28.4%)

3.8 Utilization of e-learning resources

Formal, certificate-based online training remained limited: only 13.7% had earned certificates through online medical training courses, and 23.2% had participated in an online medical education programme. By contrast, informal digital engagement was extensive: 76.2% studied collaboratively online, 87.8% used the internet regularly for study, 87.5% preferred downloading electronic content over purchasing printed materials, and 86.6% had purchased a device specifically for e-learning (Table 6).

Table 6: Distribution of students according to utilisation of e-learning resources.

Item	Yes	No
Awarded certificates through online medical training courses	45 (13.7%)	283 (86.3%)
Participated in an online medical education programme	76 (23.2%)	252 (76.8%)
Studied with friends via online meetings	250 (76.2%)	78 (23.8%)
Uses the internet regularly for studies	288 (87.8%)	40 (12.2%)
Downloaded electronic content instead of purchasing print materials	287 (87.5%)	41 (12.5%)
Purchased a device to access e-learning opportunities	284 (86.6%)	44 (13.4%)

3.9 Barriers to e-health adoption

Inadequate training was the most frequently endorsed barrier (57.3% agreement), followed by privacy and security concerns (45.1%) and resistance to change (43.0%); restricted access to technology was the least endorsed barrier (28.3%), with 39.3% neutral, consistent with the high device-ownership and internet-usage levels reported above (Table 7).

Table 7: Distribution of students according to perceived barriers to e-learning/e-health implementation.

Barrier	SA	A	N	D	SD
Lack of training	70 (21.3%)	118 (36.0%)	106 (32.3%)	14 (4.3%)	20 (6.1%)
Limited access to technology	26 (7.9%)	67 (20.4%)	129 (39.3%)	60 (18.3%)	46 (14.0%)
Concerns about patient privacy and	65 (19.8%)	83 (25.3%)	87 (26.5%)	58 (17.7%)	35 (10.7%)

information security					
Resistance to change	65 (19.8%)	76 (23.2%)	113 (34.5%)	39 (11.9%)	35 (10.7%)

3.10 Correlation between knowledge, attitude, expertise, and satisfaction

Knowledge score correlated positively with attitude score (r=0.248, p<0.001) and expertise score (r=0.174, p=0.002), and attitude score correlated positively with expertise score (r=0.188, p<0.001), indicating that better-informed students tended to hold more favourable attitudes and to rate themselves as more digitally proficient. Satisfaction score, however, was not significantly correlated with knowledge (r=0.085, p=0.126) or attitude (r=0.046, p=0.409), and showed a small but significant negative correlation with expertise (r=-0.137, p=0.013), suggesting that more digitally proficient students may hold higher expectations of e-learning platforms (Table 8).

Table 8: Correlation between knowledge, attitude, expertise, and satisfaction scores (Pearson correlation; * two-tailed).

Correlation tests								
	Knowledge Score		Attitude Score		Expertise Score		Satisfaction Score	
	Corr.	p-value	Corr.	p-value	Corr.	p-value	Corr.	p-value
Knowledge Score	1		.248**	<.001	.174**	.002	.085	.126
Attitude Score	.248**	<.001	1		.188**	.001	.046	.409
Expertise Score	.174**	.002	.188**	.001	1		-.137*	.013
Satisfaction Score	.085	.126	.046	.409	-.137*	.013	1	
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

4. DISCUSSION

This cross-sectional study of 328 medical students in Mosul demonstrates a digitally engaged student population whose familiarity with e-learning technology outpaces their comprehension of e-health as a clinical-service concept.

4.1 Sociodemographic profile and digital expertise

The near-equal sex distribution (49.1% male, 50.9% female) mirrors the rising female representation observed globally in medical education.[11] The skew toward early academic years may reflect greater availability of junior students during data collection and should be considered when generalising the findings.

A significant sex difference in self-reported digital expertise was found, with males more likely to rate themselves as excellent; this pattern is consistent with a Bangladeshi study of 1,059 students, which similarly reported greater digital competence among males regardless of age or education level, possibly reflecting differing self-assessment tendencies rather than true skill gaps.[12] In contrast, academic year showed no significant association with expertise, a finding that is not universal in the literature: some studies report higher digital competence among more senior students, whereas others find no age effect.[13,14]

4.2 Device preference and platform use

Tablets were the dominant device (84.1%), and neither sex nor residence significantly affected device choice, broadly consistent with international evidence that gender does not substantially influence digital-device preference in learning contexts, although the specific devices favoured (laptops versus tablets) vary across settings.[17] High uptake of general-purpose tools, particularly AI-based tools (86.6%), mirrors the wider global trend of AI integration into medical education[15], whereas the low uptake of specialised medical platforms such as Medscape and UpToDate may reflect cost, accessibility, or curricular integration barriers, despite the recognised value of these tools for evidence-based decision support.[16]

4.3 Knowledge of e-learning and e-health

The majority of students correctly identified the technical basis of e-learning (71.3%) and its interactive, distance-learning nature (88.4%), comparable to the 64% of Sudanese medical students who considered e-learning the best solution during COVID-19 lockdowns[17] and the 73.4% of Saudi students who reported positive attitudes toward e-health.[18] However, only 22.0% recognised the potential cost advantages of e-learning, contrasting with a Turkish study in which 71.5% of students reported improved examination performance after using paid e-learning resources[19], and only 37.8% could correctly define e-health as encompassing remote consultation, a gap consistent with the 43.6% 'satisfactory knowledge' level reported by Ghaddaripouri et al.[20] These findings point to a specific need for structured e-health curricula addressing service-delivery concepts rather than technical familiarity alone.

4.4 Attitudes toward e-learning and e-health

Scepticism about local applicability (23.8% agreement) and about e-learning substituting traditional education (26.5% agreement) echoes barriers to e-learning implementation previously reported in Iraq, including limited infrastructure.[21] Confidence in content sufficiency (69.5% agreement) and preference for downloadable material (52.7%) suggest that students value the flexibility of digital content once it is trusted,

WJAHR COPY PROOF

similar to findings from Hawler Medical University.[24] Persistent doubt about clinical applicability (only 21.1% agreement, 53.9% disagreement) is consistent with concerns that e-learning under-prepares students for clinical practice[22], while ambivalence toward e-testing (31.1% agreement, 43.9% disagreement) parallels reservations reported elsewhere about assessing clinical competence electronically.[23] Strong support for curriculum modernisation (60.1% agreement) aligns with regional calls to integrate e-health competencies formally into medical curricula.[25]

4.5 Utilisation and barriers

Formal certification remained rare (13.7%), consistent with variable participation in accredited online medical education reported elsewhere[4], whereas informal, peer-driven digital study was extensive (76.2% collaborative online study, 87.8% regular internet use for study), reflecting a broader global pattern of internet-integrated study habits among medical students.[6,9] Inadequate training (57.3%), privacy and security concerns (45.1%), and resistance to change (43.0%) emerged as the principal barriers to e-health adoption, echoing findings from Malaysian and Saudi settings that identified insufficient training and unreliable access as key obstacles to online learning.[26], while access to technology itself was rarely cited as limiting, likely reflecting the high device-ownership levels observed in this cohort.

The positive inter-correlation between knowledge, attitude, and expertise scores supports the general principle that improved understanding of digital health tools is associated with more favourable attitudes and greater self-perceived competence, while the independence and slight inverse relationship of satisfaction with expertise suggest that satisfaction with current e-learning platforms is shaped by factors beyond knowledge and skill alone, such as content quality or infrastructural reliability, and warrants further qualitative investigation.

5. CONCLUSION AND RECOMMENDATIONS

Medical students in Mosul and Ninevah demonstrated strong familiarity with the technical and multimedia aspects of e-learning but showed comparatively limited knowledge of e-health as a clinical-service concept, particularly remote consultation and its cost implications. Barriers to adoption centred on inadequate training, privacy and security concerns, and cultural resistance to change rather than lack of access to devices or connectivity, and male students reported significantly higher digital self-expertise than female students, whereas academic year showed no significant association with expertise.

Based on these findings, medical curricula should explicitly integrate e-health and telemedicine modules, including practical training in remote consultation ethics and digital clinical decision-making, complemented by mandatory structured workshops and continuing-education programmes in digital health. Institutional subscriptions and dedicated teaching sessions for advanced platforms such as UpToDate, Lexicomp, and Medscape should be provided, and simulation-based digital and telemedicine case studies should be integrated to bridge theoretical learning and clinical application. Mandatory modules on cybersecurity and patient confidentiality, together with institutional guidelines safeguarding electronic medical data, are recommended to address privacy concerns, and targeted mentorship or peer-support initiatives should be considered to promote gender-inclusive digital confidence. Finally, further research across additional Iraqi medical colleges is recommended to assess the generalisability of these findings and to evaluate the long-term impact of curricular digitalisation.

6. REFERENCES

1. Li L, Novillo-Ortiz D, Azzopardi-Muscat N, Kostkova P. Digital data sources and their impact on people's health: a systematic review of systematic reviews. Front Public Health, 2021; 9: 645260.
2. Ma M, Li Y, Gao L, Xie Y, et al. The need for digital health education among next-generation health workers in China: a cross-sectional survey on digital health education, 2023.
3. Wang Q, Su M, Zhang M, Li R. Integrating digital technologies and public health to fight Covid-19 pandemic: key technologies, applications, challenges, and outlook of digital healthcare. Int J Environ Res Public Health, 2021; 18(11): 6053.
4. Tudor Car L, Kyaw BM, Nannan Panday RS, van der Kleij R, Chavannes N, Majeed A, Car J. Digital health training programs for medical students: scoping review. JMIR Med Educ, 2021; 7(3): e28275.
5. El-Sabagh HA. Adaptive e-learning environment based on learning styles and its impact on the development of students' engagement. Int J Educ Technol High Educ, 2021; 18(1): 53.
6. Husain L. The scale up of remote consultations in UK primary care and its implications for digital health disparities, 2024.
7. Wani RUZ, Thabit F, Can O. Security and privacy challenges, issues, and enhancing techniques for Internet of Medical Things: a systematic review. Security and Privacy, 2024.
8. Dwivedi R, Bohra G, Bhardwaj A, Goel AD, Choudhary B, Sharma PP, et al. Provider's satisfaction with telemedicine services for tribals of Western Rajasthan: a qualitative analysis. J Family Med Prim Care, 2024; 13(5): 1708-14.
9. Bashir MS, Lalithabai DS, AlOtaiby S, Abu-Shaheen A. Health care professionals' knowledge and attitudes toward telemedicine. Front Public Health, 2023; 11: 957681.
10. Mahmud MM, Wong SF. Digital age: the importance of 21st century skills.

11. Boyle P. Women in medicine make gains, but obstacles remain.
12. Hossain MT, Akter S, Nishu NA, Khan L, Shuha TT, Jahan N, Rahman MM. Gender digital divide among university students in Bangladesh, 2023.
13. Department of Education and Psychology, Johannes Kepler University. Computer knowledge across academic years among Austrian students, 2012.
14. He T, Zhu C. Digital informal learning among Chinese university students.
15. Boyle P. AI in medical education: 5 ways schools are employing new tech.
16. Al-Ghamdi S. Popularity and impact of using smart devices in medicine.
17. Gismalla MDA, et al. Medical students' perception towards e-learning during the COVID-19 pandemic, 2021.
18. Aldebasi B, et al. Level of awareness of Saudi medical students of e-health, 2020.
19. Mohri P, et al. Medical students' perception of paid e-learning, 2025.
20. Ghaddaripouri K, et al. Attitude, awareness, and knowledge of e-health among medical students, 2023.
21. Al-Azawei A, Parslow P, Lundqvist K. Barriers and opportunities of e-learning implementation in Iraq: a case study of a public university, 2016.
22. Al Shawi AF, Hamad MH, Hameed AK, Kareem HQ, Khalil RN, Hamad HW. Medical students' perceptions of e-learning for clinical training, 2022.
23. Mosa AA, Ibrahim SV, Naqid IA, Hawezy DJ, Al-Jaf SM, Hussein NR. Perceptions of e-testing among medical students, 2023.
24. Shabu SA. Hawler Medical University students' perceptions of e-learning, 2023.
25. Shabila NP, Alkhateeb NE, Dauod AS, Al-Dabbagh A. Exploring the need for curriculum reform to integrate e-health competencies, 2021.
26. Roslan NS, Halim AS. Enablers and barriers to online learning among medical students during the COVID-19 pandemic, 2021.