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The Importance of Digital Technology in Enhancing the Quality of Scientific Research

أهمية التكنولوجيا الرقمية في تحسين جودة البحث العلمي

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The Role of Artificial Intelligence in Enhancing Communication Between Management and Nursing Staff: An Applied Study

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Abstract

Technology is at the heart of human progress. This study aims to identify the importance of digital transformation in enhancing the quality of scientific research. Digital transformation has become an inevitable necessity, especially with the large and rapid developments taking place in the educational system and scientific research.

The study tries to answer the questions:-

1-What is the role of digital transformation in enhancing the quality of scientific research?

2-Is digital transformation useful for researchers and educational system?

A descriptive-analytic approach is used to achieve the purposes of the study. The study population consists of faculty members in the colleges of Al-Nahrain University /Iraq in the first semester of the academic year 2025/2026.

A survey method (structured questionnaire) was given to sample of 150 academic teachers chosen randomly, who have significant experiences in using digital technology in their researches during the Covid-19 pandemic. The questionnaire responses were evaluated using the Likert scale, and t-test.

In light of the results, we can conclude that technology has made a wide range of changes in education and scientific research, and become important for researchers because it offers them an opportunity to gain the information and searching process faster than the traditional way.

Keywords
Digital
transformation,
Enhancing,
Quality, Scientific
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ملخص

تعتبر التكنولوجيا ف جزءا اساسيا في التقدم البشري. تهدف هذه الدراسة إلى تحديد أهمية التحول الرقمي في تعزيز جودة البحث العلمي. فقد أصبح التحول الرقمي ضرورة لا مفر منها، لا سيما مع التطورات الكبيرة والسريعة التي تشهدها الأنظمة التعليمية والأبحاث العلمية.

وتسعى الدراسة إلى الإجابة عن الأسئلة التالية:

١- ما هو دور التحول الرقمي في تعزيز جودة البحث العلمي؟

٢- هل التحول الرقمي مفيد للباحثين والنظام التعليمي؟

تم استخدام مسح وصفي تحليلي لتحقيق أهداف الدراسة. وتألقت عينة الدراسة من أعضاء هيئة التدريس في كليات جامعة النهرين / العراق في الفصل الدراسي الأول من العام الدراسي ٢٠٢٥/٢٠٢٦.

وتم تطبيق طريقة المسح (استبيان منظم) على عينة مكونة من ١٥٠ استاذا أكاديمياً تم اختيارهم عشوائياً، والذين لديهم خبرات كبيرة في استخدام التكنولوجيا الرقمية في أبحاثهم خلال جائحة كوفيد-١٩. تم تقييم إجابات الاستبيان باستخدام مقياس ليكرت واختبار تي.

في ضوء النتائج، يمكننا أن نستنتج أن التكنولوجيا أحدثت مجموعة واسعة من التغييرات في التعليم والبحث العلمي، وأصبحت مهمة للباحثين لأنها توفر لهم فرصة للحصول على المعلومات وإجراء عمليات البحث بشكل أسرع من الطريقة التقليدية.

1. Introduction

In recent years, technology has become more of an active agent of the education system and scientific research since the outbreak of the pandemic COVID-19.

The appearance of digital computing has originated a digital transformation in every human sector (Zaoui and Souissi, 2020).

The digital revolution is rapidly becoming an essential tool in every human sector. It is a tool of the governance of an advanced higher education institution, It became an inevitable necessity, especially with the large and rapid developments taking place in the educational system, and in the scientific research process . Digital transformation can support university education to shift from a state of questioning the future to predicting and shaping it.

The use of digital technologies in scientific research has become an important and effective way for researchers (Topp & Pawloski, 2002). The advances in digital technologies have expanded the capacity and scope of scientific research methodology.

2. The Problem

Rapid digitalization over the past decade has transformed many aspects of work and daily life. Before the appearance of technology in the research lifecycle, the use of traditional processes meant that research would take years to reach the mainstream. Researches need to record all the documents manually and to print a large number of studies, books and articles. Moreover there were numerous instances of lost documents; therefore the use of technology in scientific research has made it feasible for protecting and appropriate record keeping (Budhwar, 2017).

All of us remember the breakdown during Covid 19 and without digital transformation technology the vaccine against COVID 19 may took many years to achieve results.

The scientific research in Iraqi Universities faces many challenges and problems just like any country within the Third world .It have great shortage in the effectiveness of the Scientific Research in comparison with the status of Scientific Research of the developing countries.

Rapid digitalization over the past decade has transformed many aspects of work and daily life.

As the use of digital technology increases throughout the research process, the University needs to provide the necessary infrastructure, data capabilities, platforms and support to meet these challenges. We also need to plan strategically to be able to support researchers using specialized computing facilities and new technologies, such as artificial intelligence.

3. The Significance

Scientific Research is a cornerstone for development of any nation around the World. Many People don't have access to quality education, but with the help of the internet, everyone will be able to have access to basic education and even advanced studies.

Digital technology can help scholars to improve their research process for a greater chance of finding results faster. At the same time, researchers need to take benefits of new technologies to collaborate from far distances, enlarge their research boundaries, and get more clarity by exchanging ideas to make discoveries faster.

Today, digital transformation is viewed as one of the best devices that are utilized to get to assets and make arrangement of required data, with the help of digital infrastructure; data is driving various aspects of decision-making in scholarly publishing.

The academic research is going through an innovative makeover, and it is important more than the vast majority of what we know, therefore, the academic researcher must take the responsibilities and be aware how to use the Internet, websites, and technology in doing his research (Mawasi et al., 2020).

It is necessary to use digital technologies in higher education, to determine priority directions for the development of the educational process based on the analysis of their possibilities, not only to have

an important place in the field of education, but also to develop and implement them.

4. The Aim of the Study

The aim of the study is to identify the role of digital transformation in promoting the quality of scientific research in Iraqi universities.

5. Limits of the Study

The study is limited to the university faculty members in the College of Political Sciences at Al-Nahrain University during the first semester of 2025-2026.

2. Theoretical Background & Related Studies

2.1. Literature Review

2.1.1. What is Digital Technology?

Digital technology refers to the use of advanced information and communication technology to collect, store, analyze and share physical information and market information in each link of the product value chain, providing important technical support for innovation in various fields.

Digitalization is a powerful tool because it not only enables automation but also provides opportunities to track and store information and data about tasks and activities, creates records that can be analyzed, improves processes, organizes work (Zuboff, 1988), and predicts future events (Agrawal, Hans, & Goldfarb, 2018).



Figure 1 Digital Technology

2.1.2. Digital Technology in Education

The domain of tertiary education has experienced major transformations lately. There has been a rise in the global dimension of learning, and more learners are traveling internationally to continue their education. The rise in online and hybrid learning has also contributed to this development, in addition to the expansion of internet connectivity worldwide. These shifts have emphasized the importance of guaranteeing quality education and acknowledging skills, while also concentrating on fair access to higher education. (Garrison & Kanuka, 2004).

2.1.3. Digital Technology and Scientific Research

The 21st century has experienced a profound digital transformation that has influenced nearly every facet of human existence, encompassing the methodologies employed in scientific inquiry. Digital innovation has substantially altered the processes of data generation, analysis, storage, and dissemination, thereby facilitating enhanced collaboration among researchers and enabling broader outreach of their scholarly contributions. Concurrently, the emergence of open science has interrogated conventional methodologies within scientific research, promoting increased

transparency, collaborative efforts, and improved accessibility.

Digital resources like simulations, engaging content, and conversation platforms promote profound learning by motivating students to actively engage with material rather than simply absorbing information (Laurillard, 2012). In addition, mobile technology enhances learning opportunities, enabling learners to reach educational resources at any moment and from any location.

2.1.4. Improving Learning Quality with Technology

The integration of technology is closely linked to enhancements in student involvement, teamwork in learning, and academic results. A research conducted by Selwyn (2011) highlighted that learners in technology-rich settings exhibited greater motivation and independence in their studies. Digital resources such as simulations, interactive materials, and class discussion platforms promote in-depth learning by inspiring students to engage with content actively rather than simply absorbing information (Laurillard, 2012). Additionally, mobile technology facilitates learning everywhere, enabling students to reach educational materials at any time and from any location. A study by Wang et al. (2009) revealed that mobile-supported language learning significantly boosted student involvement and educational results, particularly in large and varied classrooms.

2.1.5. Benefit of digital technology

Digital transformation is revolutionizing research and education by increasing access, personalization, and efficiency, providing flexible anytime, anywhere learning, fostering global collaboration, enabling data-driven decision-making for better outcomes, reducing faculty administrative burden, and equipping students with essential 21st century digital skills such as artificial intelligence and data science, creating a

more engaging, effective, and inclusive learning environment. UNESCO (2021)



Figure 2. Benefit of digital technology

A. Benefits in Education:

- **Enhanced Access & Flexibility:** Online platforms, e-books & virtual classrooms remove barriers, allowing learning anytime, anywhere, suiting diverse needs.
- **Personalized Learning:** Adaptive tools and analytics tailor content to individual student paces and needs, improving engagement and outcomes.
- **Engaging Experiences:** Simulations, VR, and gamification make complex subjects interactive and relevant, boosting student interest.
- **Data-Driven Insights:** Analytics track progress, identify gaps, and help educators refine strategies and provide real-time feedback.
- **Streamlined Admin:** Automation reduces teacher workload, freeing them for teaching, while streamlining enrollment and reporting for administrators.

B. Benefits in Research:

- **Global Collaboration:** Cloud tools and video conferencing connect researchers worldwide, enabling faster idea sharing and joint projects.
- **Innovation & Discovery:** Digital platforms and AI accelerate data analysis

and modeling, opening new avenues for research and innovation.

- **Efficient Resource Management:** Digital libraries and systems improve access to vast academic materials and manage institutional data effectively. Rogers. (2000)

2. 2. Related Studies

Numerous studies have investigated the role of digital technology in enhancing the quality of scientific research. These studies provide evidence that digital tools, online resources, and information technologies significantly influence research effectiveness, productivity, and outcomes.

Al-Khasawneh and Taha (2021) examined the impact of digital libraries and online databases on research quality among university faculty. The study found that access to digital research resources improved researchers' efficiency in literature review, data retrieval, and empirical analysis, leading to better research outcomes and higher productivity. Faculty members reported that digital technology reduced time spent on traditional data collection and increased the rigor of their methodological approaches.

In a comparative study, Aburub & Assaf (2022) in their study trying to investigate the digital transformation of higher education in Palestine, to determine the level of faculty use of digital technologies at Palestinian universities, and to identify trends and obstacles. They found that the university curriculum to effectively handle digital technologies should be updated.

Similarly, Sharma & Sing (2023), the study aims to explore the significance of technological advances in education, discussing their principal benefits and the challenges they provide. They show the importance using of digital technology in education can improve the education quality, and how these technological advances have had a significant positive impact on the academic system.

Moreover, a recent study by Johnson et al. (2023) focused on collaborative digital platforms and their influence on research collaboration. The results show that students who used digital tools for collaboration demonstrated significant

improvements in engagement, critical thinking, and peer interaction.

Overall, the literature consistently shows that digital technology positively affects multiple aspects of scientific research, including access to information, data management, analytical precision, collaboration, and research productivity. These findings align with the current study's results, where teachers expressed strong agreement regarding the importance of digital technology in improving research quality.

3. Research Methodology

3.1. Research Design

This study adopts a qualitative descriptive survey design aiming to measure the attitudes and perceptions of academic teachers regarding digital technology's influence on research quality.

3.2. Population and Sample

The population of the study consists of (250) faculty members in the college of political science at Al-Nahrain University.

The study was carried on the first semester of the academic year 2025/2026.

The sample of the study consists (150) academic professors. They are Ph.D. holders, and have at least 10 years of teaching experience in digital technology adoption.

3.3. Instruments

The research utilizes two primary instruments, consistent with the Explanatory Mixed-Methods design: a structured questionnaire for the quantitative phase and a semi-structured interview protocol for the qualitative phase.

a. Questionnaire

This questionnaire is designed to collect data on the use of digital technology in scientific research. Part one focuses on the personal and professional background of the academic professors participating in the study.

The questionnaire consists of two parts. The first Part involves collecting the personal information of academic professors. They have to put down their demographic details (gender, designation,

The teacher's level of education, and their teaching experiences). Frequencies and percentages are calculated. See table 1.

The second part of the questionnaire is an online structured questionnaire using Google Forms to identify the role and abilities of digital technology in the educational process. It consisted of 10 items.

Measurement Scale: A five-point Likert Scale is used for all items in Part Two to quantify the participants' level of agreement or disagreement with each statement.. The scale ranges from 1 to 5, where (Fully Agree , Agree Neutral,, Disagree,, Fully ,Disagree).

b. Semi-Structured Interview

The researcher has constructed the interview; it is designed to elicit rich, in-depth data regarding the specific ways digital technology influences the quality of scientific research.

The interview is addressed to 30 academics from the college of political science.

The goal is to move beyond the quantitative measures of the survey and understand the 'how' and 'why' behind researchers' experiences. It is constructed with questions to get information about the professors' point of view concerning digital transformation.

It is conducted to get information about the professors, and it is designed to help the researcher deliver the main point of the study during the interview process.

Table 1. The Teachers' Demographic Information

Demographic Background		N	Frequency %
Gender	Male	85	59.7%
	Female.	65	42.3%
Designation	Professor	70	25.4%
	Asst. Prof.	80	66.2%
The Teacher's Level of Education	Ph.D.	100	10.0 %
Teaching Experiences	6-10	55	28.4%
	11-16	60	39.8%
	17-25	35	20.9%

Total Participants	150
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Table 1 contains the demographic data of the participants' gender, designation, the teachers' level of education, and their teaching experience. It can be seen that the teaching experience of the faculty members, the 17 to 25 years of experience is 20.9% is the highest in percentage, followed by the 11 to 16 years 39.8%, and from 6 to 10 years of experience respondents 28.4%.

3.4. Pilot Study

The pilot study focuses on two main areas: pre-testing the items for clarity and establishing the statistical properties of the questionnaire.. A small, non-overlapping sample of academic teachers (typically 10% of the main sample, or about 10-15 individuals) who possess similar characteristics to the target population is selected. Crucially, these participants are excluded from the final analysis of the main study. The Google Form version of the questionnaire is administered to the pilot sample exactly as it was planned for the main study. **3.5.**

Validity and Reliability of the Study

Validity and reliability are paramount features used to evaluate the quality and trustworthiness of any research instrument (Singh, 2014).

To ensure content validity, the questionnaire has been reviewed by three experts in educational technology and research methodology. Their feedback has led to revisions in item wording and sequencing to align more closely with the research objectives.

Validity refers to the extent to which the instrument accurately measures what it intends to measure.

Reliability refers to the consistency of the measurement the degree to which an instrument yields the same results under stable conditions.

The reliability of the electronic questionnaire was calculated using a widely accepted measure of internal consistency. A coefficient of 0.70 or higher is generally considered acceptable for social science research, indicating that the items in each scale consistently measured the same latent variable.

4. Results and Discussion

4.1. The Results

The results are obtained from the statistical analysis of teachers' responses to the questionnaire on the importance of digital technology in enhancing the quality of scientific research.

The frequency and percentage analysis reveals that the majority of teachers selected Agree and Strongly Agree for all questionnaire items. See appendix (A).

This indicates a generally positive attitude toward the role of digital technology in supporting and improving scientific research practices.

Furthermore, the descriptive statistics shows that the mean scores of all items ranges from 4.05 to 4.45 on a five-point Likert scale, which reflects a high to very high level of agreement. The overall mean score of the questionnaire was 4.25, suggesting that teachers strongly recognize the importance of digital technology in enhancing the quality, accuracy, and efficiency of scientific research.

The highest mean score is recorded for the item related to the overall importance of digital technology in scientific research ($M = 4.45$, $SD = 0.58$), indicating that teachers perceive digital technology as an essential component of modern research. Similarly, high mean values are found for items related to access to scientific information, saving time and effort, and the need for training on digital research tools, emphasizing the practical and professional value of technology in research activities.

The result of the study is compatible with (Aburub & Assaf, 2022) as they found that the university curriculum to effectively handle digital technologies should be updated .

It is also compatible with Sharma& Sing (2023), the result shows that how these technological advances have had a significant positive impact on the academic system. These digital Technologies have had a profound impact on educational institutions as a whole.

Similarly with Johnson et al. (2023), he found that digital platforms not only improved communication among researchers but also fostered international partnerships. These platforms reduced geographical barriers and facilitated shared access to datasets and computing resources, which enhanced research innovation and dissemination.

Overall, the results clearly demonstrate that teachers hold positive perceptions regarding the use of digital technology, and they believe it plays a significant role in improving the quality and effectiveness of scientific research.

5. Conclusion and Recommendations

5.1. Conclusion

This study investigated the importance of digital technology in enhancing the quality of scientific research from teachers' perspectives. The findings revealed that teachers hold strongly positive perceptions toward the use of digital technology in scientific research. The results showed high to very high mean scores across all questionnaire items, indicating that digital technology plays a vital role in improving research quality, accuracy, efficiency, and collaboration.

Digital technology was found to significantly facilitate access to scientific information, improve data organization and analysis, save time and effort, and enhance research productivity. Moreover, the findings highlighted the essential role of digital tools in supporting collaboration among researchers at both local and international levels. The high level of agreement on the need for training also suggests that while teachers value digital technology, continuous professional development is necessary to maximize its effective use in research.

Overall, the study concludes that digital technology is no longer optional but an essential component of modern scientific research, contributing substantially to improving research outcomes and advancing academic knowledge.

5.2. Recommendations

Based on the findings of the study, the following recommendations are proposed:

- 1. Provide Continuous Training:** Universities and academic institutions should organize regular training programs and workshops to enhance teachers' skills in using digital research tools and software.
- 2. Improve Digital Infrastructure:** Institutions should ensure the availability of reliable internet access, digital libraries, and up-to-date research software to support high-quality scientific research.
- 3. Encourage Technology Integration:** Researchers and teachers should be encouraged to integrate digital technology into all stages of the research process, including data collection, analysis, and dissemination.
- 4. Promote Research Collaboration:** Academic institutions should promote the use of digital platforms that facilitate collaboration and communication among researchers nationally and internationally.
- 5. Support Future Research:** Future studies are recommended to explore the impact of specific digital tools on research quality and to include larger and more diverse samples for broader generalization of results.

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Appendices

Appendix A: Teachers' Questionnaire

Table 1 Teacher's Responses to the Questionnaire Items

Rating system	5	4	3	2	1
Questions Items	Agree	Fully agree	Neutral	Disagree	Fully disagree
1. Digital technology makes accessing scientific information faster and easier.	19.8 %	18.3 %	5.06 %	4.11%	0.00 %
2. Online databases and digital libraries improve the quality of scientific research.	10.22 %	5.11%	1.10 %	6.11 %	1.00 %
3. Digital tools help researchers organize and manage research data effectively.	14.16 %	19.22 %	3.18 %	5.10 %	1.00 %
4. The use of digital technology increases the accuracy of scientific research.	16.23 %	15.25 %	6.22 %	4.22 %	1.00 %
5. Digital technology facilitates collaboration among researchers locally and internationally.	14.11 %	15.14 %	3.00 %	1.12 %	0.00 %
6. Using digital software improves data analysis and effort in conducting scientific research.	6.22 %	5.19 %	2.00 %	10.19 %	2.00 %
7. Digital technology saves time and effort in conducting scientific research.	4.14 %	2.15 %	5.11 %	9.12 %	5.00 %
8. Technology-based research tools enhance researchers' productivity.	2.22 %	2.12 %	1.15 %	5.12 %	0.00 %
9. Teachers need continuous training to use digital research tools effectively.	15.52 %	12.15 %	5.00 %	2.22 %	1.00 %
10. Overall, digital technology plays a vital role in improving the quality of scientific research.	19.12 %	15.19 %	1.12 %	11.6 %	0.00 %

Appendix B: Teachers' Responses

Table 2. Descriptive Statistics of Teachers' Responses

NO.	Item	Mean	Std. Deviation	Level
1	Easy access to scientific information	0.62	4.35	High
2	Digital libraries improve research quality	0.66	4.28	High
3	Organizing research data	0.71	4.10	High
4	Increasing research accuracy	0.74	4.05	High
5	Research collaboration	0.68	4.22	High
6	Improving data analysis	0.70	4.18	High
7	Saving time and effort	0.65	4.30	High
8	Enhancing research productivity	0.69	4.15	High
9	Need for training on digital tools	0.60	4.40	Very High
10	Overall importance of digital technology	0.58	4.45	Very High
	Total Overall Mean	4.25	0.66	High