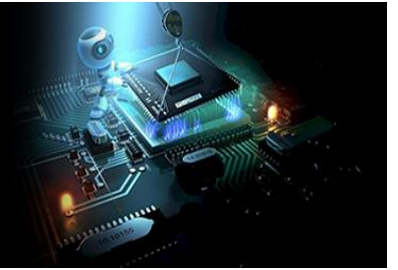


International Journal of Engineering in Computer Science



E-ISSN: 2663-3590
P-ISSN: 2663-3582
www.computersciencejournals.com/ijecs
IJECS 2025; 7(1): 260-263
Received: 10-04-2025
Accepted: 15-05-2025

Nisreen Mustafa Sajid
Anbar Education Directorate,
Anbar, Iraq

Raghdah Adnan Abdulrazzq
Business Administration
Department, College of
Administration and
Economics, University of
Kirkuk, Kirkuk, Iraq

Maher Ali Ahmed
Department of Administration
and Economics, University of
Kirkuk, Kirkuk, Iraq

Corresponding Author:
Maher Ali Ahmed
Department of Administration
and Economics, University of
Kirkuk, Kirkuk, Iraq

The role of information technology in improving technical competencies in computer science

Nisreen Mustafa Sajid, Raghdah Adnan Abdulrazzq and Maher Ali Ahmed

DOI: <https://www.doi.org/10.33545/26633582.2025.v7.i1d.186>

Abstract

This study analyzes the role of information technology in strengthening basic computer science skills and technical competencies. It addresses the gap between labor market demands and current technical skills, emphasizing the urgent need for IT tools in education and training. Using questionnaires, the study measured participants' views on their use of modern technologies. Descriptive analysis and simple regression were used to identify relationships between key variables.

Results indicated that access to IT tools and internet speed significantly enhances computing skills, with 76.7% of participants affirming the importance of tool availability and 80% noting the impact of internet speed. Additionally, cloud applications and e-learning platforms were shown to support skill enhancement, with a positive correlation found between IT-based training and skill acquisition.

Recommendations include improving access to modern devices and high-speed internet in educational settings, increasing reliance on cloud applications and e-learning platforms, and developing training programs to teach foundational computing skills, with regular assessments to ensure ongoing skill improvement.

Keywords: Information technology, technical competencies, computer science, skill development

1. Introduction

The importance of technical competencies in computer science is growing as everything shifts to the digital world. There is a shortage of cyber security workers and limited experts to fill the gap. (Marr, 2022) Traditional education methods and a lack of technological knowledge contribute to the problem. Information technology can improve competencies and is relevant to education and professional practices. The job market now requires employees to adapt to technological advancements, increasing the need for IT skills (Rizaldi *et al.* 2020). IT is becoming a requirement in all areas, including business, education, and human resources. Being up-to-date with the latest technology is important for computer technology students. Asynchronous teaching is crucial for educators who want to distribute research to off-campus students. (Haleem *et al.*, 2022) ^[1, 2, 3].

Foundations of Information Technology

The basics of IT include ubiquitous digital devices. They process data supervised by computer scientists. Humans use systems that attach various forms of information to coded meanings (Sarker *et al.*, 2021) ^[18]. IT consists of hardware, networks, and software. These components communicate data. Understanding computer systems is important for computer programmers. It is foundational to all computer science investigations. (Fagerlund *et al.*, 2021) ^[6] Footnotes

Basic Concepts in Computer Science

Computer science involves algorithms, data structures, and programming languages. To be a good programmer, one must understand computational thinking and problem-solving. (Belmar, 2022) ^[3] It is important to differentiate computer science from information technology. Computational thinking helps in understanding and solving problems. Real-world programming requires creating new functions to solve problems efficiently. This understanding enhances technical competencies in computer programming. (Caeli & Yadav, 2020) ^[4].

Modern Technologies in the Field of Information Technology: The development of information and communication technology is growing exponentially. We are in the era of the industrial revolution 4.0, with advancements in connection technology and the utilisation of AI and ML. Cloud computing has transformed industries, including education. (Goh & Sigala, 2020) ^[7] To navigate future technologies, individuals must immerse themselves in the digital ecosystem and continuously advance their competencies. Rapid technological changes have led to scientific breakthroughs and the need for new algorithms and methodologies. Research programs at the master's and doctoral levels are organized to support advanced study programs. (Wang *et al.*, 2023) ^[19] A research center will be established to remove barriers and foster progress within higher education institutions. This center will be a hub for technology transfer and provide opportunities to develop competencies demanded by society. It will become an esteemed research and execution center in computer science, engineering, and technology, delivering professional research outcomes and fostering exceptional human resources. It will also serve as a global platform for the exchange of innovative ideas and learning from diverse business approaches and experiences (Rasul *et al.*, 2023) ^[16].

Practical Applications of Information Technology in Computer Science: Information technology enhances competencies and abilities in computer science through practical applications. Students demonstrate theoretical knowledge through examples, exercises, and projects related to programming, data analysis, system architecture, and more (Dahalan *et al.*, 2024) ^[5]. Practical skills such as coding, troubleshooting, and solution design are emphasized. Practical case studies demonstrate the

effectiveness of theory in developing efficient solutions. Hands-on experience using collaborative platforms is valuable. Studying specific information technology subjects helps guide learning objectives. Hands-on coursework improves understanding and problem-solving skills. (Hazzan *et al.*, 2020) ^[9].

Impact of Information Technology on Software Development: Information technology revolutionized software development, introducing agile methodologies and DevOps, enhancing collaboration, automating processes, and improving productivity. (Mehta and Vijayakumar 2020) ^[15]. Cloud services, APIs, and version control systems have further accelerated development, boosting speed, quality, and effectiveness. Staying updated with new technologies is essential for professional and personal growth in the software domain (Kasneci *et al.*, 2023) ^[10].

Harnessing information technology in living labs has potential problems. This section addresses some challenges and risks. Changes will be considered to unify labs and avoid criticisms. Privacy concerns and data abuse are warranted due to unauthorised access. Identity and authorisation management are key aspects (Kaur *et al.*, 2022) ^[12]. Labs relying on technology are vulnerable to breakdowns. Students may become overly reliant on systems. Educational institutions and computer science research communities are undergoing fast-paced changes. Library and information science skills remain important. Adaptability and critical thinking are necessary in an IT-driven industry. Defining and integrating IT for computer science comes with risks. A true revolution is possible. Exciting times in digital evolution. (Aheleroff *et al.*, 2022) ^[1] Tables and Figures

Table 1: To illustrate descriptive statistics on access to information technology

Phrases	Arithmetic Average	Standard Deviation	Coefficient of Ariation %	Relative Weight %	Degree of Approval	Ranking
To what extent do you agree with the availability of technological tools and techniques necessary to develop your computer skills?	3.83	1.416	36.9	76.7	OK	2
To what extent do you agree that information technology has contributed to developing your skills in using computers?	3.80	0.961	25.3	76.0	OK	3
To what extent do you agree that you have access to the Internet fast enough to develop your computer skills?	4.00	1.017	25.4	80.0	OK	1
To what extent do you agree that the availability of modern devices (such as laptops or tablets) has helped you improve your computer skills?	3.33	1.269	38.1	66.7	neutral	4
To what extent do you agree that having the right software helps improve your computer skills?	3.83	1.020	26.6	76.7	OK	2
(General average) Access to information technology	3.76	1.026	27.3	75.2	OK	-

It is clear from the previous table that the overall average of access to information technology is (3.76) with a relative weight of (75.2%), and the averages of the statements ranged between (3.33 - 4.0) with a relative weight of (66.7%

- 80.0%). These percentages indicate the study sample's agreement to access Information technology and the total dimension as in the table above.

Table 2: illustrate descriptive statistics information technology and basic computer skills

Phrases	Arithmetic Average	Standard Deviation	Coefficient of Variation %	Relative Weight %	Degree of Approval	Ranking
To what extent do you agree that you use information technology to develop your basic computer skills (such as office software)?	3.00	1.339	44.6	60.0	neutral	5
To what extent do you agree that information technology has improved your understanding of networking and computer security?	3.10	1.213	39.1	62.0	neutral	4
To what extent do you agree that using cloud applications (such as Google Drive) has helped you improve your basic computer skills?	3.40	1.037	30.5	68.0	OK	2
To what extent do you agree that learning basic software (such as Microsoft Office) contributes to enhancing your computer skills?	3.43	1.478	43.1	68.7	neutral	1
To what extent do you agree that using e-learning platforms (such as Coursera) has helped you develop basic computer skills?	3.27	1.202	36.8	65.3	OK	3
(General average) Information technology and basic computer skills	3.24	0.834	25.8	64.8	OK	-

Source: From the output of the Spss program)

It is clear from the previous table that the general average of information technology and basic computer skills is (3.24) with a relative weight of (64.8%), and the averages of the statements ranged between (3.00 - 3.43) with a relative

weight of (60.0% - 68.7%). These percentages indicate the study sample's approval of technology Basic computer information and skills and the total dimension are as shown in the table above.

Table 3: To clarify the results of the simple regression between the use of information technology in education and training, and the acquisition of computer skills.

Dependent variable: M Information technology applied in training and education Independent variable: X acquisition of computer skills						
Moral level	Calculated T value	Parameter value	R	R square	Moral level	F Calculated
.000	6.320	= α 2.127	.692	.479a	.000b	25.695
.000	5.069	= β .510				

Source: From the outputs of the SPSS program.

It is clear from the table that the following

The regression results showed a significant positive relationship between variable X "acquisition of computer skills" and variable M "use of information technology in education and training," with a linear correlation coefficient (R) of 0.692 at a significance level having 0.000. This shows that the association is noteworthy at the 0.01 level, hence using information technology in training and education helps to acquire the necessary skills. Computer skills.

9. Conclusions

- The importance of technological tools in developing computing skills:** The results showed that the availability of appropriate technological tools, such as software and modern devices, plays a fundamental role in enhancing the computing skills of participants, with 76.7% approval on the availability of the necessary tools for developing these skills.
- The impact of internet speed on computer skills:** With a relative weight of 80%, the results indicated that internet access speed has a beneficial impact on people's capacity to improve their computer abilities.
- The influence of cloud tools and e-learning platforms:** With an approval rate ranging from 65.3% to 68.7%, the results demonstrated that using cloud apps and e-learning platforms helps people strengthen their fundamental computer skills.
- The positive correlation between technological**

training and skill acquisition: The statistical analysis's findings demonstrated a strong positive correlation between the acquisition of fundamental computer skills and the use of information technology in training and education, underscoring the significance of this technology in the educational process.

10. Recommendations

- Increasing the availability of information technology: To improve people's computing skills, educational institutions should increase access to current gadgets and high-speed internet.
- Promoting the use of cloud tools: Because cloud apps like Google Drive help students develop fundamental skills and collaborate digitally, it is better to rely more on them.
- E-learning platform support: It is advised to increase the usage of e-learning platforms like Coursera in order to offer specialized educational programs that aid in the development of fundamental computer skills.
- IT training program development: It is advised to create training programs that enhance the foundational knowledge of computer science, including networks and security, with an emphasis on real-world applications.
- Ongoing assessment of information technologies.

11. Acknowledgments

We would like to express our appreciation for the

cooperation of the team in providing the necessary resources for this project.

11. References

1. Aheleroff S, Huang H, Xu X, Zhong RY. Toward sustainability and resilience with Industry 4.0 and Industry 5.0. *Frontiers in Manufacturing Technology*. 2022;2:951643.
2. Ahmed MA, Sagid NM. Study the effect of the quality of electronic marketing and its relationship to purchasing an individual. *IOP Conference Series: Earth and Environmental Science*. 2021;761:012131. <https://doi.org/10.1088/1755-1315/761/1/012131>
3. Belmar H. Review on the teaching of programming and computational thinking in the world. *Frontiers in Computer Science*. 2022.
4. Caeli EN, Yadav A. Unplugged approaches to computational thinking: A historical perspective. *TechTrends*. 2020.
5. Dahalan F, Alias N, Shaharom MSN. Gamification and game-based learning for vocational education and training: A systematic literature review. *Education and Information Technologies*. 2024;29(2):1279-1317.
6. Fagerlund J, Häkkinen P, Vesisenaho M, Viiri J. Computational thinking in programming with Scratch in primary schools: A systematic review. *Computer Applications in Engineering Education*. 2021;29(1):12-28.
7. Goh E, Sigala M. Integrating Information & Communication Technologies (ICT) into classroom instruction: teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel & Tourism*. 2020.
8. Haleem A, Javaid M, Qadri MA, Suman R. Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*. 2022;3:275-285.
9. Hazzan O, Lapidot T, Ragonis N. Guide to teaching computer science. 2nd ed. Cham: Springer; 2020.
10. Kasneci E, Seßler K, Küchemann S, Bannert M, Dementieva D, Fischer F, *et al.* ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*. 2023;103:102274.
11. Jahail HH, Alu AM, Al-Sabawi ARD. Information technology and its role in enhancing the efficiency of the banking system. *Kirkuk University Journal for Administrative and Economic Sciences*. 2021;11(1):122-147.
12. Kaur J, Hazrati Fard SM, Amiri-Zarandi M, Dara R. Protecting farmers' data privacy and confidentiality: Recommendations and considerations. *Frontiers in Sustainable Food Systems*. 2022;6:903230.
13. Taj al-Din MS. Interbank market as a channel for the transmission of financial crises: Greek sovereign debt crisis as a model. *Journal of Kirkuk University: Administrative and Economic Science*. 2021;11(2):86-1131.
14. Marr B. Future skills: The 20 skills and competencies everyone needs to succeed in a digital world. London: Wiley; 2022.
15. Mehta AR, Vijayakumar S. DevOps in 2020: Navigating the modern software landscape. *International Journal of Enhanced Research in Management & Computer Applications*. 2020;ISSN 2319-7471.
16. Rasul T, Nair S, Kalendra D, Robin M, de Oliveira Santini F, Ladeira WJ, *et al.* The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning and Teaching*. 2023;6(1):41-56.
17. Rizaldi DR, Nurhayati E, Fatimah Z. The correlation of digital literacy and STEM integration to improve Indonesian students' skills in the 21st century. *International Journal of Asian Education*. 2020;1(2):73-80.
18. Sarker IH, Hoque MM, Uddin MK, Alsanoosy T. Mobile data science and intelligent apps: Concepts, AI-based modeling and research directions. *Mobile Networks and Applications*. 2021;26(1):285-303.
19. Wang H, Fu T, Du Y, Gao W, Huang K, Liu Z, *et al.* Scientific discovery in the age of artificial intelligence. *Nature*. 2023;620(7972):47-60.
20. Abdulrazzq RA, Sajid NM, Hasan MS. Artificial intelligence-driven predictive maintenance in IoT systems. *South Flo*. 2024;12:1-12. <https://doi.org/10.46>