



Developing Research Skills Through Online Platforms

Mamatova Go'zaloy Jo'ramirzayevna
Independent Researcher Gulistan State University, Uzbekistan

ABSTRACT

This thesis provides a comprehensive overview of methods for developing research skills through online platforms.

KEYWORDS: Quantum, simulator, nanoelectronics, semiconductors, online platforms.

INTRODUCTION

To study the field of semiconductor physics and quantum computing in depth, students should use scientific resources such as Google Scholar, IEEE Xplore, ScienceDirect, and ResearchGate to explore scientific developments in modern quantum computers, quantum simulators, and nanoelectronics. In addition, on platforms such as IBM Q Experience and Quantum Computing Stack Exchange, students can join scientific discussions and conduct practical research.

In present-day semiconductor physics, the following most important and useful online platforms are available for developing research skills through online platforms:

Coursera (<https://coursera.org>) offers courses on semiconductor physics, quantum physics, microelectronics, nanomaterials, and quantum computers. It teaches research methodology through theoretical knowledge and practical projects (Capstone Projects). Certificates can be obtained.

edX (<https://edx.org>) offers courses on semiconductor physics, electronic devices, and micro/nano technologies. Separate courses on scientific article writing and research methodology are available. It helps develop skills such as independent scientific research, academic writing and article preparation, and physical simulations.

NanoHUB (<https://nanohub.org>) provides free online courses and webinars on nanoelectronics and semiconductor physics. Online simulations (TCAD simulation, Quantum Dot Modeling, MOSFET Simulations) are available.

ResearchGate (<https://researchgate.net>) is a social network for researchers, where you can read and download scientific articles and share your own research. It enables direct communication with leading scientists in semiconductor physics. It develops scientific analysis skills through questions and answers.

IEEE Xplore (<https://ieeexplore.ieee.org>) is considered the largest scientific database. It contains scientific articles, conferences, and standards on semiconductor physics. It teaches the analysis of scientific literature and bibliographic skills.

Sh. R. Tojiyev expresses the following view in his research: "The development of quantum technologies is connected with the study of new nanoscale materials and devices, and predicting their electrical and optical properties is of fundamental importance." For this reason, students can develop their scientific research skills by studying the operating principles of quantum computers and semiconductor quantum dots through online platforms.

Modern science pays great attention to the study of quantum computing and the physical properties of semiconductor quantum dots. Acquiring an understanding of quantum transistors, quantum superposition, electron tunneling phenomena, and defects in the crystal lattice is essential for the development of quantum electronics. With the help of online platforms and simulation programs, students can be given in-depth knowledge about the operating principles of quantum computers and the properties of quantum states and quantum dots.

Thus, studying quantum computing technologies in semiconductor physics is useful for students not only theoretically but also practically. By using online platforms such as IBM Q, Google Quantum AI, Qiskit, and MATLAB, students will have the opportunity to write quantum computing algorithms, model nanoelectronic devices, and conduct new scientific research. This is an important factor in shaping students' research abilities, contributing to the development of science and technology, and creating innovative solutions.

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