

Role of Research in Undergraduate Education

Aruna Sharma

Journal of Scientific Dentistry (2023): 10.5005/jp-journals-10083-1043

Research is the development of new knowledge or understanding to advance science.¹ Undergraduate research is a recent concept with roots in the late nineteenth and early twentieth centuries and is presently a global concept. Undergraduate research is the exploration of a specific research topic by an undergraduate student who makes an original contribution to the discipline.^{1,2} It is a mentored investigation, promoting creative thinking, and is one of the pedagogical approaches towards teaching and learning. Students can work by themselves, can work on a research project, and can collaborate with the faculty members and peers thus helping them to establish a fruitful relationship.³ The project undertaken during undergraduate research can be later expanded into a proposal with greater details thus contributing to the scientific knowledge.

An understanding and incorporation of research methodology and hypothesis-driven scientific process can aid in developing critical thinking skills.⁴ Engaging in undergraduate research becomes an initial step in a career within the biomedical research industry for expanding healthcare innovations, accurate early diagnosis and effective treatments, and improving the quality of life of individuals. "Scaffolding Approach", wherein supportive aid is provided by faculty to learners is considered to be the best approach towards undergraduate research.⁵ Internships and industry-sponsored projects may also facilitate undergraduate research. Students will learn to search the available evidence and develop independent thinking skills that will instill confidence to draw one's own conclusions.

The advantages of undergraduate research are multi-pronged.⁶ The academic benefits include the students learning laboratory techniques, learning to interpret and analyze the results, developing a deeper understanding of the research process, and how scientists work to find solutions to problems. They also comprehend the art of integrating theory into practice. The benefits on a personal scale include learning new skills, understanding and overcoming obstacles, the importance of working in a team, the development of writing and communication skills, and a comprehensive understanding of a career path.⁷ Undergraduate research can be shared at academic conferences and can be published, thus benefitting the students and the faculty mentoring the students.⁸ Some students, especially the freshers and sophomores may find undergraduate research to be hard as they may face challenges in

Department of Pedodontics, Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth, Puducherry, India

Corresponding Author: Aruna Sharma, Department of Pedodontics, Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth, Puducherry, India, e-mail: arunasharma@igids.ac.in

How to cite this article: Sharma A. Role of Research in Undergraduate Education. *J Sci Den* 2023;13(2):37.

Source of support: Nil

Conflict of interest: None

relating their course content to the project. However, in the long term, undergraduate research can be integrated into the curriculum and can help in critical program outcome.

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