

FACTORS INFLUENCES SCIENTIFIC RESEARCH ACTIVITIES OF ENGINEERING STUDENTS AT AN GIANG UNIVERSITY

Huynh Thi Thanh Truc^{1*}, Trinh Thi Hong¹, and Ly Nguyen Ngoc Han²

¹Faculty of Engineering - Technology - Environment, An Giang University,
Vietnam National University Ho Chi Minh City, Vietnam

²Student, Faculty of Engineering - Technology - Environment, An Giang University,
Vietnam National University Ho Chi Minh City, Vietnam

*Corresponding author: Huynh Thi Thanh Truc, Email: httruc@agu.edu.vn

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Abstract

Scientific research helps enable students to access theoretical and practical knowledge in depth. However, stimulating student participation in scientific research is challenging for universities and colleges nationwide. This study was conducted on 224 students majoring in engineering at An Giang University to investigate the factors influencing student involvement in scientific research. The survey results showed that from 2018 to 2020, there were no student scientific research projects, while in 2021 there were 02 and in 2022 only 01. Among the 7 surveyed influencing factors, personal interest was the highest, accounting for 36.61%. Regarding the 4 levels of satisfaction surveyed, the majority of students were satisfied with their supervising professors, accounting for 38.83%. For accessing scientific research, understanding of scientific research accounted for only 8.93%. Therefore, we propose several solutions such as increasing bonus points for academic achievements, allocating more funding support, organizing research groups, and promoting scientific conferences within the university to enhance student participation in scientific research.

Keywords: An Giang University, education, scientific research, student, technology.

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CÁC YẾU TỐ ẢNH HƯỞNG ĐẾN HOẠT ĐỘNG NGHIÊN CỨU KHOA HỌC CỦA SINH VIÊN THUỘC KHỐI NGÀNH KHOA HỌC KỸ THUẬT TẠI TRƯỜNG ĐẠI HỌC AN GIANG

Huỳnh Thị Thanh Trúc^{1*}, Trịnh Thị Hồng¹ và Lý Nguyễn Ngọc Hân²

¹Khoa Kỹ thuật - Công nghệ - Môi trường, Trường Đại học An Giang,
Đại học Quốc gia Thành phố Hồ Chí Minh, Việt Nam

²Sinh viên, Khoa Kỹ thuật - Công nghệ - Môi trường, Trường Đại học An Giang,
Đại học Quốc gia Thành phố Hồ Chí Minh, Việt Nam

*Tác giả liên hệ: Huỳnh Thị Thanh Trúc, Email: htttruc@agu.edu.vn

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Tóm tắt

Nghiên cứu khoa học trong sinh viên là một hoạt động trí tuệ giúp sinh viên có thể tiếp cận kiến thức lý luận và thực tiễn một cách sâu rộng nhất. Tuy nhiên, việc kích thích sinh viên tham gia vào nghiên cứu khoa học là một thách thức lớn đối với các trường đại học và cao đẳng trong cả nước. Nghiên cứu này được thực hiện trên 224 sinh viên thuộc khối ngành kỹ thuật tại Trường Đại học An Giang nhằm khảo sát các yếu tố ảnh hưởng đến việc sinh viên tham gia nghiên cứu khoa học. Kết quả khảo sát cho thấy rằng từ năm 2018 đến 2020 không có đề tài nghiên cứu khoa học của sinh viên, năm 2021 có 2 đề tài và năm 2022 chỉ có 1 đề tài được thực hiện. Trong 7 yếu tố ảnh hưởng được khảo sát thì yếu tố sở thích cá nhân chiếm tỉ lệ cao nhất là 36,61%. Với 4 mức độ hài lòng được khảo sát thì đa số sinh viên đều hài lòng với giảng viên hướng dẫn và chiếm 38,83%. Trong 3 mức độ khảo sát việc tiếp cận đến nghiên cứu khoa học thì yếu tố hiểu rõ về nghiên cứu khoa học chỉ chiếm 8,93%. Từ đó chúng tôi có đề xuất một số giải pháp như tăng điểm cộng điểm rèn luyện, tăng thêm kinh phí hỗ trợ, tổ chức các nhóm nghiên cứu khoa học, đẩy mạnh các hội thảo khoa học trong nhà trường, ... nhằm tăng cường hoạt động nghiên cứu khoa học trong sinh viên.

Từ khóa: Đại học An Giang, giáo dục, kỹ thuật, nghiên cứu khoa học, sinh viên.

1. Problem statement

Scientific research is one of the crucial activities at universities aimed at enhancing the quality of students and the teaching standards of the institution. According to Collis and Hussey (2014), research is a systematic process of inquiry and investigation to systematically increase knowledge. Students need to engage in scientific research activities to develop critical thinking and practical problem-solving skills (Lee, 2008). Scientific research activities help students delve deeper into their fields of study, enhance their learning and absorption skills, and adhere to the standards expected of scientists. It contributes to producing a large number of skilled professionals capable of working in various industries and fields. This task also fosters a collaborative spirit, improves organizational discipline, and enhances a sense of responsibility among students (Nguyen, 2018). Moreover, it plays a crucial role in improving the quality of education and nurturing talent for innovative advancements (Bozeman, 2011). Importantly, scientific research activities of students are considered a criterion for evaluating and affirming the quality and prestige of the institution, as well as the teaching quality of the faculty. Additionally, the regulations for student scientific research activities in higher education institutions are specified in Circular No. 26/2021/TT-BGDĐT. Deputy Director of Hanoi National University Nguyen Huu Duc emphasizes a long-term and consistent approach, tightly linking scientific research activities with training activities and connecting them with real-life practices. Therefore, current higher education institutions are particularly concerned with promoting and developing SR activities among students to accumulate scientific methods and enhance creative thinking abilities (Do, 2017).

Students in the engineering field, when participating in research projects, play a crucial role in the development of the industry. They bring innovation and novelty from the research process, promoting the development of new products, processes, and technological solutions. Student research often focuses on solving practical issues in engineering and technology, contributing to new discoveries in the field. Students engaging in scientific research make significant contributions to

teaching and learning activities, bringing freshness and creativity to the classroom and sharing the latest knowledge and experiences gained from the research process. Reporting research results helps disseminate knowledge and encourages further research among fellow students in the field. Research not only helps students accumulate practical knowledge but also enables them to apply theoretical concepts to reality, generate new knowledge, and develop research and analytical skills. An Giang University has implemented various activities to encourage student participation in research projects, such as organizing workshops at the department level on research topics for students. During these workshops, students and professors present research proposals or results. Additionally, the university organizes competitions related to student research, such as the Green Chemistry competition for students in the Chemical Engineering Technology program. Students achieving excellence in scientific research are rewarded, and participation in research activities contributes to their overall academic performance. The university also provides financial support for approved research projects and supplies necessary equipment for the research process.

Despite numerous benefits and institutional support given, attracting students to actively participate in research remains a significant challenge. This challenge is not unique to An Giang University but is a common issue faced by universities and colleges in general. Although universities may enroll thousands of students, only a few actively participate in research activities each academic year, resulting in a limited number of research projects (Nguyen, 2020). Current trends indicate that student research activities still face certain limitations. Students are gradually neglecting their responsibility for scientific research and are instead pursuing societal trends.

Given this current situation, we conduct a survey titled "Factors Influencing the Scientific Student activities in Engineering and Technology Field at An Giang University." Based on the analysis and evaluation of the impact of these factors, the research aims to propose solutions to actively involve students in research activities and enhance scientific research quality by engineering students, as well as all students at An Giang University in general.

2. Research methodology

2.1. Scientific basis for selecting factors influencing students' scientific research activities

From studies on students' scientific research activities, we gain an overview of the crucial factors influencing scientific research participation at various universities. At the University of Finance - Marketing, the environment is identified as the most influential factor, followed by motivational factors, capabilities, and encouragement from the institution (Ha & Nong, 2018). Similarly, at the University of Agriculture and Forestry in Ho Chi Minh City, students' capabilities are evaluated as the most influential factor affecting motivation to participate in SR, along with interest from the department, institution, awareness of research, and guidance from instructors (Nguyen & Nguyen, 2022). Additionally, the authors Pham et al. (2018) emphasize the proactive nature of students and passive attitudes in the learning process that may pose challenges when engaging in scientific research. Thus, it is evident that individual psychology and mindset play a crucial role in participating research, with a positive mindset and accurate evaluation of the personal and societal roles and benefits in research activities being significant motivators for students (Chen et al., 2006; Salgueira et al., 2012).

In summary, research has demonstrated that success in scientific research activities depends on the interaction between the environment, motivation, capabilities, and encouragement. Importantly, a positive mindset and a correct assessment of the individual and societal roles and benefits in participating in research are crucial. Therefore, this study investigates the following factors: mentor guidance, financial support, infrastructure and equipment, research trends, academic achievements, personal capabilities, and student interests.

2.2. Introduction to the research object

The study surveyed the factors influencing the scientific research activities of 224 students in the engineering field at An Giang University, including 26 students in environmental engineering technology, 34 students in chemical engineering technology, and 164 students in software engineering.

Environmental Engineering Technology trains engineers capable of researching, designing, implementing, operating pollution control systems, including soil, water, and air environments.

Chemical Engineering Technology educates engineers with a solid knowledge of chemistry and the ability to apply that knowledge to contribute to the sustainable development of the industrial sector.

Software Engineering trains bachelor's degree holders in software engineering with the ability to design software according to the software production process; they have advisory and organizational capabilities to perform tasks as specialists in the software engineering field.

2.3. Implementation method

(1) The study referenced and inherited secondary data from theoretical foundations and related studies to identify factors influencing student research participation, concurrently constructing survey content and appropriate scales for the study.

(2) The formal study was conducted through online interviews. The interview content was designed on Google Forms and sent to the targeted student groups in the surveyed engineering fields.

(3) Data processing methods:

- Information processing and analysis methods: Mathematical and statistical software, creating tables representing research data, and visually illustrating charts (Excel).

- Comparative method: Comparing result data obtained from each specific study group, evaluating similarities and differences in the research status of scientific activities in different fields of engineering at An Giang University, and proposing recommendations to promote student participation in scientific research.

2.4. Results of the research and discussion

2.4.1. The current state of scientific research by engineering students from the 2018-2022 academic admissions keywords

The number of engineering students at An Giang University participating in scientific research from 2018 to 2022 has been recorded and described in Table 1. From 2018 to 2020, there was almost no research participation in by engineering students at the university. This situation exhibited a changing trend, with an increase noted from 2021 to 2022. Thus, if we consider the proportion of engineering students participating in scientific research over the past years, the rates are 0% from 2018 to 2020, 3.92% in 2021, and achieving a rate of 1.58% in 2022.

Table 1. Number of students participating in scientific research from 2018 to 2022

Year	Environmental Engineering Technology Students	Chemical Engineering Technology Students	Software Engineering Students	Total Number of Students Conducting Scientific Research	Total Number of Students in All Fields
2018	0	0	0	0	0
2019	0	0	0	0	71
2020	0	0	0	0	39
2021	0	0	2	2	51
2022	0	1	0	1	63

Based on the statistical data from 2018 to 2022, there were 2 students from the Software Engineering program and 1 student from the Chemical Engineering Technology program participating in scientific research. The Environmental Engineering Technology program did not record any participating students. Consequently, the distribution of the number of students engaged in scientific research across these fields is uneven, lacking stability in the annual student participation rates. The percentage of students involved in research is significantly low compared to the total number of students in the department.

Among the research topics pursued by students, one project received a good rating in the field of

Chemical Engineering Technology, and two projects were rated as satisfactory in the field of Software Engineering. However, the distribution of the number of students involved in research is uneven across the fields, and there is a disparity in terms of quality.

In particular, the Environmental Engineering Technology program should organize activities and workshops to facilitate the exchange of experiences among faculty, experts, and students with expertise in this field. This aims to promote effective awareness, motivate students, and foster positive thinking for active research participation. Additionally, it contributes to enhancing their knowledge and effectively contributes to the research process.

Table 2. Classification of scientific research

Department	Rating	Excellent	Good	Average
Environmental Engineering Technology		0	0	0
Chemical Engineering Technology		1	0	0
Software Engineering		0	2	0

2.4.2. Factors influencing students' research motivation:

The feedback results from students indicate that there are several obstacles to their involvement in scientific research. Some factors influencing research motivation identified by students include financial support, guidance from instructors, research facilities and equipment, research trends among students, academic achievements, personal capabilities, and individual interests.

Figure 1 shows that the assessment of the impact of these factors on students' research activities accounts for about one-third of the surveyed students. In terms of influence, the factor of personal interest is rated the highest at 36.61%, followed by the factors of instructor guidance and research trends among students, both at 35.71%. Financial support for

students is rated at 34.38%, personal capabilities at 34.38%, research facilities and equipment at 31.25%, and finally, academic achievements at 29.91%. According to student evaluations, personal interest is deemed crucial, as students will either be inclined toward or disinterested in research. Some students demonstrate high flexibility and acuity in grasping and identifying societal needs. Furthermore, exposure to various sources of information allows students to have a multidimensional, comprehensive, and intriguing perspective on pertinent scientific issues. This fosters a passion for science, a spirit of curiosity, and an eagerness to explore new horizons. However, alongside those passionate about scientific research, there are students who prefer practical activities or, in other words, gaining experience through hands-on work rather than engaging in research. Each student

has a unique perspective and different interests, contributing to certain variations in the rate of student scientific research participation.

Regarding the level of complete influence, students believe that the factor of research facilities and equipment is the most important, accounting for 27.23%. The factors of personal capabilities, instructor guidance, and personal interests are evaluated at 23.21%, 22.77%, and 21.88%, respectively. Following these are the factors of academic achievements at 18.75%, financial support at 15.63%, and finally, research trends among students at 13.39%. Research facilities are deemed the most critical, prompting the university to provide adequate equipment to support student scientific research participation. Currently, the laboratories at the University of An Giang are well-invested in the necessary equipment to support both learning and research activities. Each year, the university conducts surveys to assess the needs of departments and disciplines, aiming to meet the demands of both faculty and students.

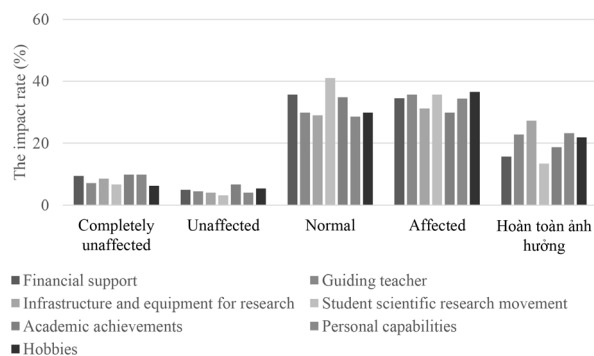


Figure 1. Percentage (%) of Student Ratings on the Influence Level of Factors on Research Activities

2.4.3. Students' satisfaction level with the organization of research activities by the university

The survey results indicate that the majority of engineering students are satisfied with the quality of organization and support provided by the university in terms of financial assistance, guidance from instructors, and the research activities' atmosphere, with satisfaction levels ranging from 28% to 40%. Most students express satisfaction with the support

provided by instructors, with a satisfaction rate of 38.83%. Students value the assistance of experienced academic advisors who provide guidance, encourage creativity, help refine and develop innovative thinking, and foster critical thinking. Advisors play a crucial role in motivating and inspiring students, aiding them in choosing research topics, planning, literature review, data collection, processing, and analysis to complete a research report.

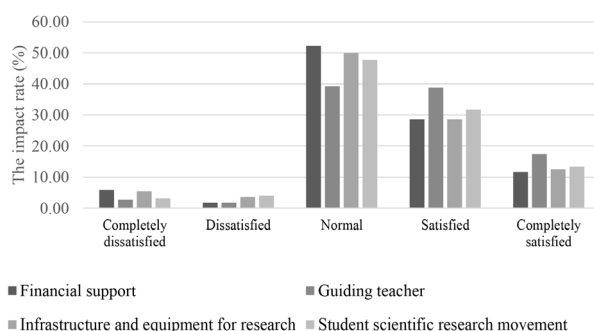


Figure 2. Percentage (%) of Student Ratings on the Satisfaction Level with the University's Research Activities Organization

2.4.4. Students' access level to research activities in engineering fields

Among the three survey levels regarding access to research activities, understanding scientific research accounts for only 8.93%. This result indicates that students in the environmental engineering, chemical engineering, and software engineering fields have heard about SR but do not have a deep understanding. The involvement in research activities is limited due to the insufficient promotion efforts by the department, youth union, and the university. It has not effectively attracted students, especially first-year students who are unfamiliar with such activities. Additionally, students often take part-time jobs to earn income, reducing the time available for research and hindering a comprehensive understanding of the benefits that research participation can bring. It is crucial to emphasize that engaging in scientific research also enhances job opportunities after graduation, providing suitable positions related to their studied fields and ensuring a stable income.

Table 3. Students' access level in various engineering field

Access Level	Understand	Heard About	Not Aware
Environmental Engineering Students	3	19	4
Chemical Engineering Students	4	27	3
Software Engineering Students	13	115	34

2.4.5. Essential skills for students in scientific research

Every student participating in research requires a foundational knowledge base, but it doesn't stop there. The research process demands continuous supplementation and improvement of one's knowledge. Therefore, several fundamental skills are crucial, especially for students passionate about research. Figure 3 illustrates the necessity levels of these skills for students engaged in scientific research.

The statistics from the chart indicate that most students need to equip themselves with essential skills such as communication, presentation, foreign languages, problem-solving, teamwork, time management, leadership, listening, adaptability to change, pressure handling, persuasion, and building trust. Among these, students rate teamwork as the most essential skill, followed by listening, problem-solving, time management, adaptability to change, persuasion, and trust-building (all rated by over 90 students out of the total 224 surveyed).

For the level of necessity, leadership skills are highly regarded, especially when involved in research. Students may conduct individual or group research, and in the case of teamwork, having a team leader is crucial for efficient task management. These soft skills are essential for every student engaged in scientific research and serve as a critical foundation for nurturing potential scientists in the future.

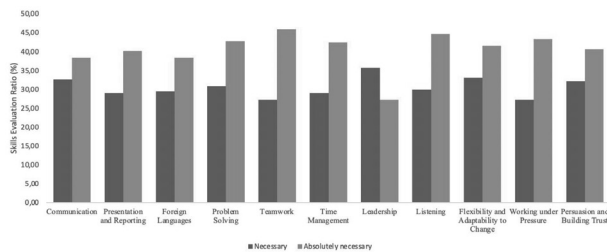


Figure 3. Percentage (%) of students' evaluation of the necessity level of skills when participating in scientific research

3. Conclusion and recommendations

3.1. Conclusion

The survey results reveal seven crucial factors influencing the motivation for scientific research among students in the technical disciplines at An Giang University. Specifically, these factors include financial support, guidance from instructors, infrastructure and research equipment, student

research activities, academic achievements, personal capacity, and interests. Notably, interest and research equipment are rated the highest in terms of their impact on students' research motivation.

Furthermore, the research findings indicate that the majority of students in the technical disciplines are satisfied with the quality of education and support provided by the university, especially with regard to mentorship. However, students' access to scientific research still faces limitations. Most students only have a superficial understanding of research without delving deeper. This is particularly crucial for students in technical disciplines, where there are ample opportunities to engage in scientific research, receive research funding, and access job opportunities after graduation. Therefore, departments and the university need to enhance awareness to help students efficiently and proactively approach scientific research.

3.2. Recommendations

Based on the current situation, we propose several measures to promote students' research activities at An Giang University:

Create an Ideal Research Environment: Establish an environment conducive to scientific research for students, encouraging their curiosity, exploration, and creativity. Promote self-awareness and passion for engaging in research through training sessions, scientific workshops, and introducing research activities to students.

Encourage Through Rewards: At the department level, incentivize student scientific research participation by implementing reward policies.

Guidance and Motivation from Instructors: Instructors should employ active teaching methods, combined with scientific activities, to help students access and apply information technology in their research. Guide students in researching interdisciplinary topics and encourage in-depth exploration of research themes.

Enhance University Support and Attention: Increase financial support, add bonus points for research-related activities, and encourage students to participate in national and international research conferences and workshops.

Organize Research Groups to Develop Teamwork Skills: Improve students' teamwork skills

by organizing scientific research groups. Enhance foreign language proficiency, as it is a crucial tool for accessing advanced scientific knowledge.

These recommendations aim to create a positive research environment, encourage student participation in research activities, and contribute to enhancing the research quality at An Giang University.

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