

Students' Attitudes Towards Education in Biology-Related Disciplines and the Need for Internationalization: A Survey at a Vietnamese University

Hoang-Nam Tran, Tokushima University, Japan
Thi-Binh-Nguyen Tran, Vietnam National University of Agriculture, Vietnam
Xuan-Canh Nguyen, Vietnam National University of Agriculture, Vietnam
Thi-Nhien Nguyen, Vietnam National University of Agriculture, Vietnam

The Barcelona Conference on Education 2023
Official Conference Proceedings

Abstract

This survey examined the attitudes of 538 undergraduate students enrolled at a Vietnamese university towards biology-related disciplines. Employing a structured questionnaire, the study explored several aspects, including students' interests in various biology-related fields, their motivations for pursuing these disciplines, their opinions on teaching methods, their aspirations for internationalization and study abroad experiences, the essential skills they believed were crucial for success, and the areas in teaching that required improvement. The survey results indicated that students acknowledged the significance of fields such as medicine and veterinary sciences, with their motivations largely influenced by job prospects and societal needs. Moreover, the results identified specific areas in teaching that students wanted to have improvement, such as laboratory work, practical skills development, fieldwork experiences, and exchange programs, and their attitude towards internationalization and study abroad opportunities, in relations to the factors such as age, gender, grade, and major. The insights gained from this survey can contribute to the enhancement of educational strategies and the creation of an engaging learning environment for students majoring in biology-related disciplines.

Keywords: Attitudes, Biology-Related Disciplines, Internationalization, Study Abroad, Teaching Methods, Undergraduates

iafor

The International Academic Forum
www.iafor.org

Introduction

In recent years, the field of biology has witnessed remarkable advancements, influencing various sectors such as veterinary medicine (Gyles, 2016), environmental conservation, and agriculture (Kassam, 2020). This has underscored the significance of biology-related disciplines in addressing contemporary challenges and shaping the future. Within this context, understanding students' attitudes towards biology-related disciplines becomes crucial, as their perceptions and motivations can significantly impact their academic choices, career trajectories, and the broader scientific community.

Numerous studies have explored students' attitudes towards various biology-related disciplines, shedding light on factors that influence their preferences, motivations, and perceptions either at secondary (Acarlı & Acarlı, 2020), high school (Ekli et al., 2009) or college level of education (Beumer, 2019).

Previous research on students' attitudes towards science disciplines has revealed that their interests and motivations are shaped by a variety of factors. These factors encompass personal interests, career aspirations, societal influences, and educational experiences (Beumer, 2019; Prokop et al., 2007). Studies conducted in diverse cultural contexts have demonstrated that students often prioritize fields with perceived lucrative job prospects, aligning their choices with societal needs and economic opportunities. Furthermore, the influence of teaching methods and curricular structures on students' attitudes has been widely explored. Practical experiences, such as laboratory work, fieldwork, and study abroad programs, have been recognized as pivotal components in fostering students' engagement and interest in science disciplines (Prokop et al., 2007). These investigations have contributed to the refinement of educational strategies and curricula, aiming to create more engaging and effective learning environments.

However, within the Vietnamese context, limited research has been done about the attitudes of school students or undergraduates towards biology-related disciplines, despite the growing importance of these fields in the global landscape. This gap is particularly pertinent given the evolving academic and economic landscape in Vietnam, where the importance of scientific expertise and innovation is steadily increasing (Tran, 2013; Trung & Swierczek, 2009). Understanding how Vietnamese students perceive biology-related disciplines and identifying their motivations, preferences, and suggestions for improvements in teaching methods and curricula is essential for tailoring educational strategies to meet their needs and aspirations.

This research seeks to bridge this gap by examining the attitudes of undergraduate students enrolled at a university in Vietnam towards biology-related disciplines. It aims to accomplish the following objectives:

- Investigate the specific biology-related fields that Vietnamese undergraduate students are most interested in and understand the motivations driving their preferences.
- Examine students' opinions on existing teaching methods in biology-related disciplines, identifying areas that require improvement and exploring factors influencing their perceptions.
- Investigate students' attitudes towards internationalization and study abroad experiences, and analyze how factors like age, gender, grade, and major might influence these attitudes.
- Identify the essential skills that students believe are crucial for success in biology-related disciplines and determine specific areas in teaching that students

perceive as needing enhancement, such as laboratory work, practical skills development, fieldwork experiences, and exchange programs.

- Provide recommendations for improving educational strategies and creating a more engaging and effective learning environment for students pursuing biology-related disciplines in Vietnam's higher education.

By addressing these objectives, this research aims to contribute to the understanding of students' attitudes towards biology-related disciplines within the Vietnamese context and provide valuable insights for educational institutions seeking to enhance their curricula and programs in response to students' preferences and aspirations.

Methodology

The current study used a cross-sectional survey design to collect data from a diverse sample of undergraduate students enrolled in biology-related disciplines at a university in Vietnam. A structured questionnaire was designed to encompass the research objectives and includes both closed-ended and Likert scale questions for quantitative data collection, as well as open-ended questions for qualitative insights. The Likert 5-level scale consists of response options including "strongly disagree," "disagree," "neutral," "agree," and "strongly agree". The data was conducted in summer 2023 in the form of an online survey to maximize response rates and accommodate participants' preferences. Quantitative analysis was conducted using SPSS software. We used descriptive statistics to summarize demographic characteristics, interests, motivations, and perceptions; and inferential statistics to identify relationships between variables. Qualitative data related to students' suggestions for improvement in teaching methods, essential skills, and internationalization aspirations were analyzed using KH-Coder software.

Results

The survey was completed by a total of 538 undergraduate students enrolled in biology-related disciplines at a Vietnamese university. The sample consisted of diverse participants representing various majors, genders, grades, and age groups.

Perceived Subjects of Importance and Interests

Table 1 represents the mean ratings of importance assigned by 538 undergraduate students to various fields of study on a Likert 5-level scale. These mean scores indicate the average level of importance or priority given to each subject by the students surveyed. According to the data, the subjects with the highest mean scores and thus perceived as the most important by the undergraduate students are Medicine (3.99), Veterinary medicine (3.91), and Genetics (3.68). These subjects received the highest average ratings, suggesting that the students consider them to be important. Other subjects that received relatively high mean scores include Biotechnology (3.66), Zoology (3.66), Cell biology (3.66), Microbiology (3.68), and Parasitology (3.65). These subjects are also viewed as important by the students surveyed. Subjects such as Environmental biology (3.61), Agriculture (3.53), Botany (3.39), Ecology (3.50), Biochemistry (3.53), Bioinformatics (3.47), and Husbandry (3.68) received slightly lower mean scores but still above-average priority ratings. It is important to note that the list of subjects was not included some important fields such as Food technology.

Table 1. Fields of importance / priority? (N=538)

	Mean	Median	Mode	SD
Medicine	3.99	5	5	1.20
Veterinary medicine	3.91	4	5	1.18
Genetics	3.68	4	5	1.18
Microbiology	3.68	4	5	1.18
Husbandry	3.68	4	5	1.17
Biotechnology	3.66	4	5	1.22
Zoology	3.66	4	4	1.15
Cell biology	3.66	4	5	1.18
Parasitology	3.65	4	5	1.19
Environmental biology	3.61	4	5	1.23
Agriculture	3.53	4	4	1.18
Biochemistry	3.53	4	4	1.17
Ecology	3.50	4	4	1.19
Bioinformatics	3.47	4	4	1.17
Botany	3.39	3	4	1.21
Others	2.77	3	1	1.50

Table 2 shows the mean scores assigned by 538 undergraduate students to various fields of study based on their interest. The scores were collected using a Likert 5-level scale, where higher scores indicate a greater level of interest. The fields with the highest mean interest scores from the undergraduate students are Veterinary medicine (3.73), Medicine (3.45), and Genetics (3.28). These subjects received the highest average interest ratings, suggesting that the students have a relatively high level of interest in these fields. Other fields that received above-average mean interest scores include Biotechnology (3.24), Microbiology (3.25), Parasitology (3.23), and Cell biology (3.26). These subjects are also perceived as interesting by the students surveyed. Subjects such as Environmental biology (3.06), Agriculture (3.04), Botany (3.07), Ecology (3.10), Biochemistry (3.10), Bioinformatics (3.04), and Husbandry (3.23) received slightly lower mean interest scores but still indicate some level of interest among the students.

Table 2. Fields of interest?

	Mean	Median	Mode	SD
Veterinary medicine	3.73	4	5	1.28
Medicine	3.45	4	5	1.30
Zoology	3.39	3.5	4	1.27
Genetics	3.28	3	3	1.31
Cell biology	3.26	3	3	1.30
Microbiology	3.25	3	4	1.28
Biotechnology	3.24	3	3	1.36
Parasitology	3.23	3	3	1.31
Husbandry	3.23	3	3	1.31
Ecology	3.10	3	3	1.31
Biochemistry	3.10	3	3	1.29
Botany	3.07	3	3	1.30
Environmental biology	3.06	3	3	1.32
Agriculture	3.04	3	3	1.31
Bioinformatics	3.04	3	3	1.29
Other	2.60	2	1	1.52

Study Motives

Table 3 shows the mean scores assigned to different motivations for studying biology-related subjects. Participants were asked to rate their motivations on a 5 level Likert scale. The motivations that received relatively higher mean scores are meeting social needs (3.54), finding a job (3.50), and loving the subject (3.48). These motivations indicate that participants are driven by their interest in the subject, the desire for career opportunities, and the desire to contribute to society. Motivations such as liking research (3.33) and business (3.32) also received above-average mean scores, suggesting that some participants are motivated by the opportunities for research and business-related applications in the field of biology. On the other hand, having family in the field (2.71) received a lower mean score, indicating that it is a less influential motivation for the participants surveyed.

Table 3. Motives to study biology-related subjects

	Mean	Median	Mode	SD
Meet social needs	3.54	4	5	1.25
To find job	3.50	4	5	1.27
Love the subject	3.48	3	5	1.30
Like research	3.33	3	5	1.32
Business	3.32	3	5	1.30
Has family in the field	2.71	3	1	1.47
Others	2.44	2	1	1.49

Perceptions About Teaching Quality

Regarding perceived teaching-learning quality, participants were asked to evaluate their perceptions. Table 4 presents students' perceptions regarding the education they receive in biology-related subjects. The mean scores generally indicate a positive perception across all aspects, with median and mode values supporting this consistency. The mean perception score for theoretical teaching aspects such as lecturers' quality, lecture content quality and curriculum are relatively high, indicating that students tend to view the quality of theoretical class positively. On the contrary, practical and field training received lower scores indicate the need of paying more attention on practical experiences, such as laboratory work and fieldwork, in enhancing their engagement and understanding of the subjects. In the qualitative data, a substantial number of participants indicated that there is room for improvement in these practical components. Many suggested that integrating more hands-on activities, real-world applications, and interactive learning methods could enhance their learning experiences.

Table 4. Students' perceptions about the education of biology-related subjects

	Mean	Median	Mode	SD
Lecturers' quality	3.91	4	4	0.87
Lectures	3.84	4	4	0.85
Curriculum	3.83	4	4	0.86
Practice training quality	3.81	4	4	0.88
Field training quality	3.79	4	4	0.89
Laboratory quality	3.7	4	4	0.93

Internationalization and Study Abroad Aspirations

Table 5 provides insight into individuals' attitudes towards internationalization, with a focus on various aspects related to international cooperation and involvement in an educational setting. The respondents placed higher importance on the need for strengthening international cooperation to bring education up to international standard and to have more exchange

programs. Respondents seemed not interested in higher number of international students, foreign lecturers or programs conducted in English.

Table 5. Attitude on internationalization

	Mean	Median	Mode	SD
International cooperation	4.01	4	5	1.14
International standard	4.00	4	5	1.11
Short-term exchange Prog.	3.96	4	5	1.10
Having int'l students	3.85	4	5	1.11
Hiring foreign lecturers	3.80	4	5	1.13
EMI pilot program	3.70	4	5	1.18

Table 6 displays the study abroad intentions of the respondents. Only 10% of the respondents currently have immediate plans to continue their education abroad. However, when considering students who contemplate studying abroad later, over half of the students have expressed an intention to study abroad. From qualitative data, the majority of participants expressed a strong interest in international exposure and the chance to study abroad.

Table 6. Study Abroad Intention for graduate degree

	Frequency	Percent
Will study abroad	54	10.0
May study abroad later	229	42.6
Will study domestic	73	13.6
No more study	182	33.8
Total	538	100.0

Essential Skills

Participants were asked to identify the essential skills they considered crucial for success in biology-related disciplines. Figure 1 shows the word cloud of their responses. The responses were categorized into both hard skills and soft skills, offering a comprehensive understanding of the competencies that students deem important. Many participants emphasized the significance of acquiring hard skills for success in biology-related fields. These practical skills encompassed areas such as laboratory techniques, research methodologies, and observational abilities. The emphasis on these hard skills underscores the importance of hands-on experience in effectively navigating the demands of scientific research and analysis. Furthermore, participants highlighted the need for specialized knowledge in specific areas of biology, indicating the growing recognition of the interdisciplinary nature of modern biological sciences. In addition to hard skills, participants recognized the importance of soft skills in their academic and professional pursuits. Effective communication emerged as a prominent soft skill, with participants acknowledging the ability to convey complex scientific concepts to diverse audiences as essential. Teamwork was also highlighted as a vital skill for collaboration in group projects and interdisciplinary research settings. Moreover, participants identified self-learning and adaptability as crucial soft skills in an evolving scientific landscape, where the capacity to stay updated with new developments is paramount.



Figure 1. Skills needed as perceived by students

Improvement Areas

Participants' insights into areas requiring improvement within the teaching of biology-related disciplines provided valuable guidance for enhancing the learning experience. A significant portion of participants expressed the need for more comprehensive laboratory work, emphasizing hands-on practice in applying theoretical concepts. Practical skills development was specifically mentioned, indicating a desire for more structured opportunities to acquire and refine technical skills. Additionally, participants voiced a desire for more meaningful fieldwork experiences, which could offer real-world context to theoretical learning. The call for exchange programs highlighted an aspiration for cross-cultural exposure and diverse learning environments, indicative of a broader perspective on education.

Discussion

The findings of this survey-based research shed light on the attitudes of undergraduate students towards biology-related disciplines at a Vietnamese university. Through an exploration of various dimensions, including students' interests, motivations, teaching methods, internationalization aspirations, essential skills, and areas for improvement, this discussion section seeks to contextualize the results within the broader landscape of science education and offer implications for enhancing educational strategies.

The survey results reveal that undergraduate students demonstrated a significant interest in biology-related fields, particularly those with perceived direct job prospects such as veterinary sciences or biotechnology. These preferences align with societal needs and economic opportunities, highlighting the pragmatic considerations that influence students' academic choices. Such motivations underline the role of education in not only fostering scientific curiosity but also aligning academic pursuits with real-world demands. There is almost no evidence about interests of undergraduates towards biology-related disciplines. However, there are plenty of such study targeting school students. The current study's findings are in line with some previous literature which found that high school students are interested in zoology, genetics, biotechnology; so they believe that the researches on the medicine, genetics and human biology (Ekli et al., 2009). Positive attitude of school students are found to be

influenced by factors such as gender, grade, education environment, life style (Acarlı & Acarlı, 2020; Almasri et al., 2021; Weinburgh & Englehard, 1994). But in the current study, we did not find factors associated with the motivation and interest.

The participants' opinions on essential skills for success in biology-related disciplines mirror the demands of modern science. These findings underscore the multifaceted nature of success in biology-related disciplines. While hard skills equip students with the technical proficiencies needed for research and practice, soft skills empower them to effectively communicate, collaborate, and adapt within the scientific community. The emphasis on critical thinking, communication, problem-solving, and teamwork aligns with the multifaceted nature of scientific research and collaboration. The current finding support the evidences that collaborative learning in biology could be effective in specific context (Almasri et al., 2021).

The need to emphasize on practice-based learning was reported in literature (Tran, 2013; Trung & Swierczek, 2009). In the current study, the students' call for improvements in laboratory work, practical skills development, fieldwork experiences, and exchange programs underscores the importance of experiential learning. These findings advocate for pedagogical approaches that bridge theoretical knowledge and practical application. These findings highlight the importance of hands-on learning experiences, which have been shown to enhance student engagement and comprehension. Integrating more practical components into the curriculum could lead to a more enriching learning environment, catering to diverse learning styles and promoting holistic skill development. The identified improvement areas align with the growing recognition of the value of practical experiences in science education, emphasizing the need to bridge the gap between theory and application for a well-rounded academic journey.

The insights gained from the current study hold valuable implications for educational strategies within the context of biology-related disciplines. The emphasis on practical components calls for curricular revisions that integrate more hands-on experiences, ensuring a balance between theoretical understanding and practical application. Initiatives aimed at fostering internationalization should consider tailored interventions that address the unique preferences and barriers faced by different demographic groups.

The attitudes of students towards internationalization and study abroad experiences provide intriguing insights into their broader educational aspirations. This study emphasizes the need for tailored strategies to promote international exposure. Literature has shown initiatives such as bringing new concepts and strategies into biology-related lessons (Knippels & Waarlo, 2018; Tipmontiane & Williams, 2021), or applying different approaches based on gender (Isaak et al., 2022). Institutions could consider targeted programs and approaches to encourage students to explore global academic environments, fostering cross-cultural competence and expanding their horizons.

It is important to acknowledge the limitations of this research. The study's focus on a single Vietnamese university may limit the generalizability of the findings to broader educational contexts. Additionally, self-report bias and the cross-sectional design pose inherent limitations. Future research could adopt longitudinal designs and involve multiple institutions to enhance the robustness and generalizability of the findings.

Conclusion

This survey-based research offers valuable insights into the attitudes of undergraduate students towards biology-related disciplines at an university in Vietnam. The findings underscore the importance of aligning educational strategies with students' interests, aspirations, and skill development needs. By tailoring teaching methods and curricula to incorporate practical experiences and promoting internationalization opportunities, educational institutions can cultivate an environment that nurtures well-rounded, motivated, and globally competent professionals in the field of biology-related disciplines.

References

- Acarlı, D. S., & Acarlı, H. A. (2020). Examination of Students' Attitudes Towards Biology and Biology Course in Terms of Gender, Grade Level and Pet-Keeping. *Problems of Education in the 21st Century*, 78(3), 328–341. <https://doi.org/10.33225/pec/20.78.328>
- Almasri, F., Hewapathirana, G. I., Ghaddar, F., Lee, N., & Ibrahim, B. (2021). Measuring attitudes towards biology major and non-major: Effect of students' gender, group composition, and learning environment. In *PLoS ONE* (Vol. 16, Issue 5 May). <https://doi.org/10.1371/journal.pone.0251453>
- Beumer, A. (2019). Student attitudes towards biology in an introductory biology course at a two-year, open access college. *Journal for Research and Practice in College Teaching*, 4(1), 40–54.
- Ekli, E., Karadon, H. D., & Sahin, N. (2009). High school students attitudes and opinions regarding biology course and biological sciences. *Procedia - Social and Behavioral Sciences*, 1(1), 1137–1140. <https://doi.org/10.1016/j.sbspro.2009.01.204>
- Gyles, C. (2016). Advances in veterinary practice. *The Canadian Veterinary Journal = La Revue Veterinaire Canadienne*, 57(8), 811–812.
- Isaak, R. C., Kleinert, S. I., & Wilde, M. (2022). The Influence of Gender and Interest on the Use of Learning Strategies in Biology Lessons. *European Journal of Educational Research*, 11(3), 1245–1257.
- Kassam, A. (Ed.). (2020). *Advances in Conservation Agriculture: Practice and Benefits*. Burleigh Dodds Science Pub.
- Knippels, M.-C. P. J., & Waarlo, A. J. (2018). Development, Uptake, and Wider Applicability of the Yo-yo Strategy in Biology Education Research: A Reappraisal. *Education Sciences*, 8(3). <https://doi.org/10.3390/educsci8030129>
- Prokop, P., Tuncer, G., & Chudá, J. (2007). Slovakian students' attitudes toward biology. *Eurasia Journal of Mathematics, Science and Technology Education*, 3(4), 287–295. <https://doi.org/10.12973/ejmste/75409>
- Tipmontiane, K., & Williams, P. J. (2021). The Integration of the Engineering Design Process in Biology-related STEM Activity: A Review of Thai Secondary Education. *ASEAN Journal of Science and Engineering Education*, 2(1), 1–10. <https://doi.org/10.17509/ajsee.v2i1.35097>
- Tran, T. T. (2013). Limitation on the development of skills in higher education in Vietnam. *Higher Education*, 65(5), 631–644. <https://doi.org/10.1007/s10734-012-9567-7>
- Trung, T. Q., & Swierczek, F. W. (2009). Skills development in higher education in Vietnam. *Asia Pacific Business Review*, 15(4), 565–586. <https://doi.org/10.1080/13602380802364175>

Weinburgh, M. H., & Englehard, G. (1994). Gender, Prior Academic Performance and Beliefs as Predictors of Attitudes Toward Biology Laboratory Experiences. *School Science and Mathematics*, 94(3), 118–123.
<https://doi.org/10.1111/j.1949-8594.1994.tb15635.x>

Contact email: tran@tokushima-u.ac.jp