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Learning Beyond the Classroom: Educational Impacts of a Long-Term Multidisciplinary Robotics Student Team

Dr. Anderson Harayashiki Moreira, Instituto Mauá de Tecnologia

Graduated in Control and Automation Engineering from Instituto Mauá de Tecnologia (IMT) (2008). Master in Mechatronics Engineering from the Instituto Tecnológico de Aeronáutica (ITA) (2011). PhD in Mechatronics Engineering from the Instituto Tecnológico de Aeronáutica (ITA) (2017). He is currently a professor at the Instituto Mauá de Tecnologia. He develops activities and research in the area of mobile autonomous robotics, control systems, industrial robotics and microcontroller systems.

Miss Andressa Corrente Martins, Instituto Maua de Tecnologia

Andressa Martins is holds a master's degree in Aerospace Systems and Mechatronics with a focus on Robotics from the Aeronautics Institute of Technology and a degree in Control and Automation Engineering from the Universidade Paulista. Currently, she is a professor at the Mauá Institute of Technology. She has experience in the field of Control and Automation Engineering (Mechatronics), working mainly on the following topics: Intelligent Systems, Digital Twin, Industrial Automation, Instrumentation, Robotics, Mechanism Design, and Engineering Fundamentals.

Alexandre Harayashiki Moreira

Alexandre Harayashiki Moreira received M.S. (2017) in multirobot system from UFABC Univ., Brazil. Since 2016, he has been a Member of Control & Automation Research group at Maua Institute of Technology focused on autonomous robots and smart cities.

Fernando Silveira Madani,

Fernando Silveira Madani holds a Bachelor's degree in Control and Automation Engineering (Mechatronics) and a Ph.D. in the same field, with extensive experience in engineering education, including over 20 years of teaching and more than 18 years in academic leadership as a Program Director. He obtained his M.Sc. (2001) and Ph.D. (2009) in Aeronautical and Mechanical Engineering from the Aeronautics Institute of Technology (ITA), with research emphasis on Aerospace Systems Dynamics and Mechatronics. He completed his undergraduate studies at Universidade Paulista in 1997.

He is currently Vice-Provost at the Centro Universitário do Instituto Mauá de Tecnologia, where he is also a researcher affiliated with the Intelligent Mechatronic Systems and Robotics (S.M.I.R.) research group. In addition, he serves as a member of evaluation committees of the Brazilian Ministry of Education (INEP/MEC), contributing to the assessment of undergraduate programs in Control and Automation Engineering and Mechatronics.

Learning Beyond the Classroom: Educational Impacts of a Long-Term Multidisciplinary Robotics Student Team

Introduction

Engineering education has increasingly emphasized the need to complement formal coursework with learning experiences that promote professional competencies alongside technical knowledge. While traditional engineering curricula provide essential theoretical foundations, they often offer limited opportunities for students to systematically develop skills such as teamwork, leadership, communication, and project management [1], [2]. These competencies, however, are central to contemporary engineering practice and are explicitly reflected in accreditation frameworks such as ABET student outcomes.

In response to this gap, co-curricular learning experiences have gained prominence as important components of engineering education. Prior research has shown that participation in co-curricular activities can enhance student engagement, persistence, and professional identity formation, particularly when these experiences involve authentic, open-ended problem solving [3], [4]. Such environments allow students to integrate knowledge across domains while engaging in social and organizational practices that more closely resemble professional engineering work.

Among co-curricular experiences, student-led engineering teams—including design teams, competition teams, and robotics teams—have been widely studied within the engineering education community. Research presented at the ASEE Annual Conference and related venues has demonstrated that participation in these teams contributes positively to technical skill development, teamwork, communication, and students' understanding of engineering practice [5]–[6]. These teams often function as situated learning environments in which students learn through participation, mentorship, and increasing responsibility over time.

Robotics teams, in particular, offer a rich context for multidisciplinary learning. Students are typically responsible for a wide range of activities, including mechanical design, electronics, control systems, embedded programming, and system integration. In addition, many teams require students to manage budgets, coordinate schedules, secure resources, and interact with external stakeholders. This combination positions robotics teams at the intersection of technical competence and professional practice, aligning closely with experiential learning theories and established engineering education frameworks [6].

Despite growing interest in student teams as learning environments, much of the existing literature focuses on short-term outcomes or single cohorts, often examining students' experiences over the duration of a single academic year or competition cycle. Several authors have noted the difficulty of assessing sustained educational impact and organizational learning in co-curricular programs, highlighting a need for studies that examine long-term and longitudinal dimensions of student participation. Questions remain regarding how learning processes evolve over time, how knowledge is transferred between successive generations of students, and how participation influences academic engagement and career trajectories beyond graduation.

This paper addresses these gaps by presenting a mixed-methods case study of a long-standing multidisciplinary robotics student team operating within a private engineering institution. The team brings together undergraduate students from multiple engineering disciplines, computing, and design, spanning different academic years and experience levels. Participation involves both technical project development and organizational responsibilities, creating a learning environment that mirrors many aspects of professional engineering practice.

The purpose of this study is to investigate the educational impact of participation in this robotics team, with particular attention to technical and professional skill development, academic engagement, career influence, and longitudinal learning dynamics. Data were collected through a structured survey administered to current team members and alumni, complemented by qualitative open-ended responses that capture reflective perspectives on learning experiences.

Guided by this context, the study addresses the following research questions:

- RQ1: What technical and professional competencies do students perceive as developing through participation in a multidisciplinary robotics team?
- RQ2: How does participation in the team influence students' academic engagement and perceived career trajectories?
- RQ3: How do learning processes and roles evolve over time within the team, particularly with respect to mentorship and knowledge transfer across student generations?

By examining these questions, this paper contributes empirical, longitudinally informed evidence to the engineering education literature on the role of long-term co-curricular experiences as sustainable learning environments. The findings aim to inform educators and institutions seeking to design, support, and assess multidisciplinary student teams as integral components of engineering education.

Context of the Robotics Team

The case examined in this study is a long-standing multidisciplinary robotics student team operating within a private engineering institution in Brazil. The team has been active for over two decades and engages undergraduate students from multiple engineering disciplines, as well as computing and design, spanning different academic years and levels of experience. Participation in the team is voluntary and co-curricular, complementing formal coursework with sustained, project-based learning experiences.

The team regularly participates in national and international robotics competitions, which provide the primary context for project development and performance evaluation. These competitions encompass a range of categories, including autonomous sumo robots, line-following robots, micromouse, and robot combat. As a result, students are required to design, build, program, and test complete robotic systems under realistic constraints related to time, resources, robustness, and performance. Typical projects involve mechanical design and fabrication, electronic hardware development, embedded programming, control systems, and system integration.

Beyond technical development, the team operates as a student-led organization, with members assuming responsibility for a variety of non-technical tasks essential to project success. These responsibilities include project planning, internal coordination, mentoring of new members, resource management, and interaction with external partners and sponsors. This organizational structure positions the team as an authentic learning environment that mirrors many aspects of professional engineering practice, reinforcing both technical competence and professional skill development.

The team is intentionally structured to be multidisciplinary and vertically integrated, enabling students at early stages of their academic programs to collaborate closely with more experienced peers. Learning occurs through hands-on participation, peer instruction, and progressive assumption of responsibility. Knowledge transfer between generations is supported by informal mentorship practices and shared project documentation, contributing to continuity across successive cohorts of students.

Faculty supervision plays a central role in the sustainability and educational coherence of the team. The team is supervised by faculty members who were themselves former student participants during their undergraduate studies at the same institution. This continuity contributes to the preservation of the team's culture, values, and pedagogical practices over time, while maintaining a student-centered approach to learning.

In addition to technical mentoring, faculty supervisors act as institutional facilitators, supporting communication between the student team and academic leadership. This role includes assisting with access to infrastructure, alignment with institutional policies, and coordination with administrative units, thereby reducing organizational barriers while preserving student autonomy in technical and managerial decision-making.

Faculty involvement also supports structured mentorship and long-term knowledge transfer, as supervisors possess both disciplinary expertise and experiential understanding of the team's learning dynamics. This dual perspective enables guidance that is responsive to student needs while reinforcing organizational learning and continuity across student generations.

Together, these characteristics establish the robotics team as a rich co-curricular learning environment in which technical development, professional skill formation, and longitudinal learning processes are tightly interconnected. This context provides a robust foundation for examining the educational impacts of sustained participation in multidisciplinary student teams.

Experimental Methods / Project Approach

This study employs a mixed-methods case study approach to examine the educational and professional impacts of participation in a long-standing multidisciplinary robotics student team. A case study design is particularly appropriate for investigating complex learning environments situated at the intersection of curricular and co-curricular education, where contextual, organizational, and longitudinal dimensions are central to understanding learning processes.

The research integrates quantitative data collected through a structured survey with qualitative data obtained from open-ended responses. This combination enables triangulation between participants' self-reported perceptions and reflective narratives, strengthening the credibility and interpretive depth of the findings.

Participants

The study involved 43 participants, including both current members and alumni of the robotics team. The inclusion of alumni allowed the investigation to capture not only immediate learning outcomes but also perceived longer-term impacts on academic engagement and professional development.

Over the more than two decades of operation, the robotics team has had approximately 105 student members. The survey invitation was distributed through the team's social media channels (e.g., Instagram), which serve as a primary communication platform with current members and alumni. Because the invitation was disseminated through open social media posts, it was not possible to determine precisely how many former members viewed the invitation, and therefore an exact response rate could not be calculated. Nevertheless, the 43 valid responses represent a substantial proportion of the estimated population. This coverage provides meaningful insight into experiences across different generations of team members.

Participants represented multiple academic backgrounds, including engineering disciplines, computing, and design, and varied in length of participation in the team, ranging from less than one year to more than four years. In addition, respondents reported a variety of roles within the team, including technical and organizational responsibilities, providing indirect indicators of different levels of engagement and involvement over time. As is typical in voluntary co-curricular settings, the level of engagement varied among participants depending on project roles, time availability, and competition cycles.

Participation in the study was voluntary and anonymous. All respondents provided informed consent prior to completing the survey.

Data Collection Instrument

Data were collected using an online questionnaire developed specifically for this study. The instrument was organized into thematic sections addressing technical skill development, professional and interpersonal skill development, academic engagement and sense of belonging, career influence and professional relevance, longitudinal learning dynamics (including mentorship and knowledge transfer), and overall evaluation of the learning experience.

Most items employed a five-point Likert scale (1 = Strongly disagree, 5 = Strongly agree). In addition, four open-ended questions invited participants to reflect on their most valuable learning experiences, differences between team-based learning and traditional coursework, perceived impacts on academic and professional trajectories, and areas for improvement in team organization or pedagogy.

The questionnaire was conceptually aligned with established engineering education frameworks, including experiential learning principles and ABET student outcomes, particularly those related to teamwork, communication, problem solving, and lifelong learning.

An overview of the survey instrument and the main constructs assessed in this study is presented in Table 1, including representative dimensions, scale format, and alignment with the research questions. The complete survey instrument is provided in Appendix A.

Table 1. Overview of the survey instrument and measured constructs.

Construct	Measured dimensions / example items	Scale / format	Related Research Question(s)
Technical skill development	Mechanical design and fabrication; electronics and hardware integration; embedded programming; control systems; system integration; engineering problem solving	5-point Likert (1 = Strongly disagree, 5 = Strongly agree)	RQ1
Professional skill development	Teamwork in multidisciplinary contexts; communication (oral and written); leadership and decision making; project planning and management; time management; autonomous learning	5-point Likert	RQ1
Academic engagement and belonging	Engagement with the engineering program; connection between theory and practice; sense of belonging to the engineering community	5-point Likert	RQ2
Career impact	Influence on career choices; relevance of team experience to current professional activities; perceived value in recruitment processes	5-point Likert	RQ2
Longitudinal learning dynamics	Role evolution (novice to mentor); peer mentoring; knowledge transfer between generations; organizational learning over time	5-point Likert	RQ3
Reflective learning experiences	Most valuable learning experience; differences between team-based learning and traditional coursework; perceived academic and professional impact; suggestions for improvement	Open-ended (text responses)	RQ1–RQ3

Data Analysis

Quantitative data were analyzed using descriptive statistics, including means and standard deviations, to identify patterns in perceived learning outcomes and impacts. Given the exploratory and case-based nature of the study, the analysis emphasized pattern identification and convergent evidence across constructs rather than hypothesis testing. Where appropriate, comparative descriptive analyses were conducted between current members and alumni to explore differences between immediate and longer-term perceptions of learning and professional impact.

Qualitative data from open-ended responses were analyzed using an inductive thematic analysis approach. Initial coding focused on identifying recurring themes related to learning processes, professional identity development, and distinctive characteristics of the team-based learning environment. Representative excerpts were selected to illustrate key findings and to complement the quantitative results.

Validity and Limitations

To enhance the credibility of the findings, the study employed methodological triangulation through the integration of quantitative and qualitative data sources. Internal consistency was supported by convergence across related survey items and thematic coherence in open-ended responses.

Several limitations should be acknowledged. The study relies on self-reported perceptions, which may be influenced by recall bias, particularly for alumni reflecting on past experiences. Additionally, although the robotics team has operated for more than two decades, data collection occurred at a single point in time, limiting the ability to conduct formal longitudinal statistical analyses. Nevertheless, retrospective perceptions provide meaningful insight into sustained learning impacts and organizational continuity.

Alumni participants were contacted through open calls distributed via the team's social media channels, inviting all former members to participate. As with any voluntary survey, the possibility of self-selection bias cannot be fully excluded, including the potential overrepresentation of alumni with more positive experiences or outcomes. This limitation was considered in the interpretation of results, which emphasize perceived impacts rather than causal claims.

Results and Discussion

This section presents and discusses the results obtained from the analysis of 43 valid survey responses from current members and alumni of the multidisciplinary robotics team. The findings are organized according to the study's research questions and are discussed with reference to the constructs summarized in Table 1, integrating quantitative trends with qualitative insights from open-ended responses.

Technical and Professional Skill Development

Results related to technical skill development indicate a strong perceived educational impact across all evaluated competencies. As shown in Table 2, mean scores for all technical domains exceeded 3.8 on a five-point Likert scale, with particularly high values observed for system integration and engineering problem solving (M = 4.61, SD = 0.78). These results suggest that participation in the robotics team provides students with sustained exposure to complex, open-ended engineering challenges that require the integration of multiple technical domains.

Table 2. Descriptive statistics for perceived technical skill development (n = 43).

Technical competency	Mean	SD
Mechanical design and fabrication	4.36	0.89
Electronics and hardware integration	4.39	0.97
Embedded programming	4.30	1.09
Control systems	3.82	1.23
Systems engineering concepts	4.00	1.26
System integration and engineering problem solving	4.61	0.78

Competencies related to mechanical design, electronics, and embedded programming also exhibited high mean scores, reinforcing the interpretation that team participation supports hands-on development of core engineering skills. Slightly lower mean values and higher variability were observed for control systems, which may reflect differences in individual roles, prior knowledge, or depth of involvement across participants. Nevertheless, the overall pattern indicates strong perceived gains in technical competence.

The comparatively lower mean score observed for control systems can be interpreted in light of the team's historical and curricular context. The systematic application of classical control techniques, such as PID controllers, was incorporated into team projects only in more recent years, initially in line-following robots and later in micromouse platforms. In addition, the formal concepts required to design and tune such control systems are typically addressed in the later years of control and automation engineering programs. As a result, participants with shorter periods of involvement, those who participated in earlier phases of the team's development, or those not directly involved in platforms requiring closed-loop control may have had limited exposure to control system applications, influencing their perceptions of learning in this domain.

Professional skill development demonstrated similarly strong trends. As presented in Table 3, all professional competencies received mean scores above 4.2, with the highest values associated with autonomous learning (M = 4.68, SD = 0.67) and teamwork in multidisciplinary contexts (M = 4.64, SD = 0.65). These findings highlight the role of the robotics team as a co-curricular environment in which students develop professional competencies that are central to contemporary engineering practice.

Table 3. Descriptive statistics for perceived professional skill development (n = 43).

Professional competency	Mean	SD
Teamwork in multidisciplinary contexts	4.64	0.65
Communication (oral and written)	4.52	0.85
Leadership and decision making	4.36	0.89
Project planning and management	4.27	0.69
Time management	4.21	0.82
Autonomous learning	4.68	0.67

Qualitative responses reinforce these quantitative patterns. Participants frequently described learning to coordinate tasks across disciplines, communicate technical decisions effectively, and assume responsibility for project outcomes. Several respondents explicitly contrasted these experiences with traditional coursework, emphasizing the sustained accountability and collaborative problem solving required by team participation.

Together, these results provide strong support for RQ1, indicating that sustained participation in a multidisciplinary robotics team contributes meaningfully to the development of both technical and professional competencies.

Exploratory comparisons indicated that participants with longer involvement tended to report higher perceived gains across most competencies, suggesting a cumulative learning effect associated with sustained participation.

Academic Engagement and Sense of Belonging

Results related to academic engagement and sense of belonging further underscore the broader educational impact of team participation. High mean scores across constructs associated with engagement, theory–practice connection, and belonging (see Table 1) suggest that the robotics team serves as a meaningful context for integrating formal learning with practical application.

Participants frequently described the team as a space in which concepts learned in coursework could be applied and tested in authentic situations. Qualitative responses emphasized increased motivation, persistence in the engineering program, and stronger identification with the engineering profession. These findings align with prior research linking co-curricular involvement to enhanced engagement and retention in engineering education.

Career Impact

Results related to career impact address RQ2 and indicate that participation in the multidisciplinary robotics team had a substantial and lasting influence on students' professional trajectories. Constructs associated with influence on career choices, relevance of the team experience to current professional activities, and perceived value during recruitment processes (see Table 1) exhibited consistently high levels of agreement among respondents.

Alumni responses, in particular, highlight the transferability of skills developed through team participation to professional contexts. Participants frequently emphasized competencies such as problem solving under real-world constraints, interdisciplinary communication, and project coordination as directly applicable to their current roles. Several respondents noted that experiences gained through the robotics team were positively received by employers and served as concrete examples of practical engineering competence during recruitment processes.

Qualitative responses further illustrate this impact. Participants described the team as an environment that clarified career interests, influenced decisions regarding specialization or industry sector, and provided early exposure to professional engineering practices. These reflections suggest that the team experience functioned not only as a learning environment but also as a career-shaping experience, supporting students in developing professional identity and confidence prior to graduation.

Taken together, these findings suggest that sustained participation in a multidisciplinary robotics team supports career readiness and professional alignment, reinforcing the role of co-curricular experiences as bridges between engineering education and the engineering workforce. These results extend prior work on student teams by highlighting their potential for long-term career influence beyond immediate academic outcomes.

Longitudinal Learning Dynamics and Knowledge Transfer

Findings associated with longitudinal learning dynamics address RQ3 and provide insight into how learning processes evolve over time within the robotics team. Constructs related to role evolution, peer mentoring, and knowledge transfer across student generations (see Table 1) received high agreement, indicating that participants perceived clear learning trajectories throughout their involvement.

Participants consistently reported progression from novice roles toward positions of greater technical and organizational responsibility. This evolution was frequently accompanied by increased involvement in mentoring newer members, suggesting that teaching and supporting others constituted an advanced stage of learning. Qualitative responses emphasized informal mentoring practices, collaborative problem solving, and shared responsibility as central mechanisms through which knowledge was transferred and sustained within the team.

These dynamics were reinforced by the team's vertically integrated structure and faculty-supported continuity, which together facilitated organizational learning despite regular student turnover. Participants highlighted the importance of learning from more experienced peers and, later, contributing to the learning of newcomers, creating a cyclical process of knowledge transmission and role development.

The results suggest that the robotics team functions as a longitudinal learning environment, in which learning extends beyond individual projects or academic terms. Rather than isolated skill acquisition, participants described a cumulative process of growth encompassing technical competence, professional responsibility, and mentoring capacity. This finding underscores the importance of organizational structures and sustained faculty engagement in enabling long-term educational impact within co-curricular engineering programs.

Over time, the team incorporated new technical domains, including more systematic use of control systems and expanded participation in additional competition categories, reflecting an adaptive learning environment responsive to technological and educational developments.

Lessons Learned

The findings of this study provide several insights that may inform educators and institutions seeking to design, support, or sustain multidisciplinary co-curricular engineering teams. Drawing on quantitative results and qualitative reflections, the lessons presented below highlight key elements that contributed to the educational effectiveness and longevity of the robotics team examined in this case study.

Sustained, Long-Term Participation Enhances Learning Depth

One central lesson is that extended participation over multiple academic terms or years plays a critical role in deepening learning outcomes. Participants consistently reported progression from basic technical tasks to more complex system-level responsibilities, accompanied by increased professional and leadership competencies. This suggests that co-curricular initiatives should be structured to encourage continuity rather than short-term involvement, enabling students to experience cumulative learning and role evolution.

Integration of Technical and Professional Responsibilities Is Essential

The results indicate that meaningful learning occurs when students are responsible not only for technical development but also for organizational and managerial tasks. Combining activities such as design, programming, testing, project planning, and coordination with stakeholders created an environment that closely mirrored professional engineering practice. Institutions seeking to replicate similar models should avoid over-structuring student teams in ways that isolate technical work from broader project responsibilities.

Multidisciplinary and Vertically Integrated Teams Foster Peer Learning

A key contributor to learning effectiveness was the multidisciplinary and vertically integrated structure of the team. Collaboration among students from different academic backgrounds and experience levels supported peer instruction, informal mentoring, and knowledge exchange. These dynamics were central to both technical skill development and professional growth. Designing teams that intentionally mix disciplines and academic stages can strengthen learning outcomes while promoting a culture of collaboration.

Mentorship and Knowledge Transfer Require Organizational Support

While peer mentoring emerged as a powerful learning mechanism, the study also highlights the importance of intentional structures that support knowledge transfer. Participants emphasized the role of experienced members in guiding newcomers and preserving organizational memory. Faculty supervision that facilitates continuity, without undermining student autonomy, was instrumental in sustaining these processes. This finding underscores that mentorship does not emerge automatically and benefits from institutional recognition and support.

Faculty Involvement Should Enable, Not Replace, Student Leadership

Faculty supervision contributed significantly to the sustainability and coherence of the team, particularly by facilitating institutional communication and supporting mentorship. However, the educational value of the team was closely tied to students maintaining ownership of technical and organizational decisions. Effective faculty involvement balanced guidance with autonomy, positioning instructors as facilitators rather than managers. This balance appears critical for fostering leadership development and professional identity formation.

Career Impact Strengthens the Value Proposition of Co-Curricular Teams

The perceived influence of team participation on career trajectories reinforces the role of co-curricular experiences as bridges between engineering education and professional practice. Participants identified the team as a context for developing transferable skills, clarifying career interests, and gaining experiences valued by employers. For institutions, articulating this career relevance can strengthen student motivation, institutional support, and long-term sustainability of similar initiatives.

An important observation is that sustained involvement in the team did not occur at the expense of academic performance; on the contrary, several former participants were later recognized for high levels of academic achievement within their degree programs.

Assessment Should Combine Quantitative and Qualitative Approaches

Finally, this study highlights the value of mixed-methods assessment for capturing the multifaceted impact of co-curricular engineering teams. Quantitative measures provided evidence of convergence across key learning constructs, while qualitative reflections offered insight into learning processes and contextual factors. Institutions evaluating similar initiatives should consider assessment approaches that integrate both forms of evidence to better understand educational impact.

Conclusion

This paper presented a mixed-methods case study examining the educational impact of sustained participation in a long-standing multidisciplinary robotics student team. By integrating quantitative survey data from 43 current members and alumni with qualitative reflections, the study investigated technical and professional skill development, academic engagement, career impact, and longitudinal learning dynamics associated with this co-curricular experience.

The findings provide strong evidence that participation in the robotics team contributes meaningfully to the development of core technical competencies, particularly those related to system integration and engineering problem solving, as well as professional skills such as teamwork, communication, leadership, and autonomous learning. These results address RQ1 by demonstrating that the team functions as an effective environment for holistic engineering learning that extends beyond the scope of traditional coursework.

Results related to academic engagement and career impact further highlight the broader educational significance of the team. Participants reported increased engagement with their engineering programs, stronger connections between theory and practice, and substantial influence on career trajectories. These findings address RQ2, reinforcing the role of co-curricular student teams as bridges between formal engineering education and professional practice.

The study also provides insight into longitudinal learning dynamics within the team, addressing RQ3. Participants described clear progression from novice roles to positions of greater responsibility and mentorship, supported by peer learning and faculty-facilitated continuity. These dynamics suggest that the team operates as a vertically integrated learning environment in which knowledge is transferred and sustained across successive student generations.

Several limitations should be acknowledged. The study relies on self-reported perceptions, which may be subject to recall bias, particularly among alumni. In addition, data were collected at a single point in time, limiting the ability to conduct formal longitudinal statistical analyses. While the sample size was sufficient to identify consistent trends, future studies could benefit from longitudinal data collection across multiple cohorts and the inclusion of complementary assessment measures, such as performance artifacts or external evaluations.

Despite these limitations, the results contribute empirical evidence to the engineering education literature on the value of long-term, multidisciplinary co-curricular experiences. The findings suggest that sustained student teams, when supported by appropriate organizational structures and faculty facilitation, can serve as powerful and sustainable learning environments within engineering programs.

Future work will focus on expanding longitudinal data collection, exploring comparative analyses with other co-curricular models, and investigating how specific organizational practices influence learning outcomes. Such efforts may further inform the design, assessment, and institutional support of multidisciplinary student teams as integral components of engineering education.

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Appendix A

Survey Instrument

This appendix presents the complete survey instrument used to investigate the educational and professional impacts of participation in a multidisciplinary robotics student team. The questionnaire was administered online and completed voluntarily and anonymously. Responses were used exclusively for academic research purposes.

Unless otherwise indicated, items were measured using a **five-point Likert scale** (1 = Strongly disagree, 5 = Strongly agree).

Section 1 – Informed Consent

1. Do you agree to participate in this research study?

☐ Yes, I agree to participate

☐ No, I do not agree to participate

Section 2 – Participant Profile

2. Current status:

☐ Current team member

☐ Former team member (alumni)

3. Primary field of study (select one):

☐ Control and Automation Engineering

☐ Electrical / Electronic Engineering

☐ Mechanical Engineering

☐ Computer Engineering

☐ Chemical Engineering

☐ Civil Engineering

☐ Computer Science

☐ Design

☐ Other: __________

4. Duration of participation in the robotics team:

☐ Less than 1 year

☐ 1–2 years

☐ 3–4 years

☐ More than 4 years

5. Year participation started (optional):

(Open response)

6. Roles performed in the team (select all that apply):
☐ Mechanical design
☐ Electronics / hardware
☐ Programming
☐ System integration
☐ Technical leadership
☐ Management / organization
☐ Fundraising / industry liaison
☐ Social media
☐ Other: _________

Section 3 – Technical Skill Development
7. Participation in the team contributed to the development of the following technical competencies:
(1 = Strongly disagree | 5 = Strongly agree)

- Mechanical design and fabrication
- Electronics, embedded systems, and hardware integration
- Programming
- Robotics
- Control systems
- System integration and testing
- Engineering problem solving

Section 4 – Professional Skills
8. Participation in the team contributed to the development of the following professional competencies: *(1 = Strongly disagree | 5 = Strongly agree)*

- Teamwork in multidisciplinary contexts
- Oral and written communication
- Leadership and decision making
- Project planning and management
- Time management and responsibility
- Autonomous learning

Section 5 – Learning and Academic Engagement
9. Participation in the team: *(1 = Strongly disagree | 5 = Strongly agree)*

- Increased my engagement with my academic program
- Helped connect theory and practice
- Provided learning experiences beyond formal coursework
- Fostered a sense of belonging to the engineering community

Section 6 – Professional Trajectory
10. Current professional status:
☐ Undergraduate student
☐ Graduate student

☐ Industry professional
☐ Entrepreneur / startup
☐ Academia / research
☐ Other: _________

11. Sector of professional activity:
☐ Manufacturing
☐ Automation / Robotics
☐ Software / AI
☐ Aerospace
☐ Automotive
☐ Consulting
☐ Other: _________

12. Participation in the team: *(1 = Strongly disagree | 5 = Strongly agree)*
- Influenced my career choices
- Is relevant to my current professional activities
- Was valued by recruiters

Section 7 – Learning Evolution and Knowledge Transfer
13. Regarding learning dynamics within the team: *(1 = Strongly disagree | 5 = Strongly agree)*
- I evolved from a learner to a contributor/mentor
- More experienced members supported my learning
- There was effective knowledge transfer across team generations
- The organization of the team improved over time

Section 8 – Open-Ended Questions
14. What was the most valuable learning experience you had in the team?

15. How did learning in the team differ from learning in traditional coursework?

16. How did participation in the team influence your academic or professional trajectory?

17. What could be improved in the organization or pedagogy of the team?

Section 9 – Overall Evaluation

18. Overall evaluation: *(1 = Strongly disagree | 5 = Strongly agree)*
- Participation in the team was a significant learning experience
- I would recommend a similar team to other students