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UNIVERSITY EXTENSION AS A STRATEGY FOR PROMOTING THE MATERIALS ENGINEERING COURSE: RESULTS AND IMPACTS OF PROJEMAT

EXTENSÃO UNIVERSITÁRIA COMO ESTRATÉGIA DE DIVULGAÇÃO DO CURSO DE ENGENHARIA DE MATERIAIS: RESULTADOS E IMPACTOS DO PROJEMAT

EXTENSIÓN UNIVERSITARIA COMO ESTRATEGIA DE DIVULGACIÓN DEL CURSO DE INGENIERÍA DE MATERIALES: RESULTADOS E IMPACTOS DEL PROJEMAT

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ABSTRATC

University extension projects play a strategic role in promoting scientific and professional fields that are still little known to society. This study reports and analyzes the actions of the Extension Project for the Promotion of the Materials Engineering Program at the School of Technology of the State University of Amazonas (PROJEMAT), aimed at disseminating the Materials Engineering program at UEA and strengthening its integration with schools, industries, and the community. Regarding methodology, the actions were structured in different areas, including interactive lectures in high schools, technical visits to local industries, guided tours of university laboratories, student welcoming pro-grams, workshops, and continuous dissemination through social media. The results showed significant engagement

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of 815 high school students who par-ticipated in the lectures, with a measurable increase in interest in the program and direct enrollments of participants. The technical visits promoted interaction with the productive sector and generated professional opportunities, while ac-ademic workshops and reception activities strengthened the sense of belong-ing among undergraduate students. Therefore, it is concluded that PROJEMAT was an effective strategy to strengthen the ties between university and com-munity, improve student training, and consolidate extension as a vector of sci-entific dissemination and professional development in the Materials Engineer-ing program.

Keywords: University extension. Materials Engineering. High school. Industry. Social Me-dia.

RESUMO

Os projetos de extensão universitária desempenham um papel estratégico na promoção de áreas científicas e profissionais ainda pouco conhecidas pela sociedade. Este estudo relata e analisa as ações do Projeto de Extensão para Promoção do Curso de Engenharia de Materiais da Escola Superior de Tecno-logia da Universidade do Estado do Amazonas (PROJEMAT), destinado a di-vulgar o curso de Engenharia de Materiais da Universidade do Estado do Amazonas (UEA) e fortalecer sua integração com escolas, indústrias e a co-munidade. No que se refere à metodologia, as ações foram estruturadas em diferentes frentes, incluindo palestras interativas em escolas de ensino médio, visitas técnicas a indústrias locais, visitas guiadas a laboratórios universitários, programas de acolhimento de estudantes, workshops e divulgação contínua através das redes sociais. Nos resultados foram observados um envolvimento expressivo de 815 estudantes do ensino médio que participaram das palestras, com aumento mensurável no interesse pelo curso e ingressos diretos de parti-cipantes. As visitas técnicas promoveram interação com o setor produtivo e ge-raram oportunidades profissionais, enquanto oficinas acadêmicas e atividades de recepção fortaleceram o senso de pertencimento entre os alunos de gradu-ação. Dessa forma, conclui-se que o PROJEMAT constituiu uma estratégia eficaz para estreitar os laços entre universidade e comunidade, aprimorar a formação discente e consolidar a extensão como vetor de divulgação científica e de desenvolvimento profissional no curso de engenharia de materiais.

Palavras-chave: Extensão Universitária. Engenharia de Materiais. Ensino Médio. Indústria. Redes Sociais.

RESUMEN

Los proyectos de extensión universitaria desempeñan un papel estratégico en la promoción de áreas científicas y profesionales aún poco conocidas por la sociedad. Este estudio relata y analiza las acciones del Proyecto de Extensión para la Promoción del Curso de Ingeniería de Materiales de la Escuela Superi-or de Tecnología de la Universidad del Estado de Amazonas (PROJEMAT), destinado a divulgar el curso de Ingeniería de Materiales de la UEA y fortalecer su integración con escuelas, industrias y la comunidad. En cuanto a la meto-dología, las acciones se estructuraron en diferentes frentes, incluyendo char-las interactivas en escuelas secundarias, visitas técnicas a indústrias locales, recorridos guiados por laboratorios universitarios, programas de acogida de estudiantes, talleres y difusión continua a través de las redes sociales. Los re-sultados mostraron una participación significativa de 815 estudiantes de se-cundaria en las charlas, con un aumento medible en el interés por el curso y matrículas directas de participantes. Las visitas técnicas promovieron la inte-racción

con el sector productivo y generaron oportunidades profesionales, mi-entras que los talleres académicos y las actividades de recepción fortalecieron el sentido de pertenencia entre los estudiantes de grado. De esta manera, se concluye que el PROJEMAT constituyó una estrategia eficaz para estrechar los vínculos entre universidad y comunidad, mejorar la formación estudiantil y consolidar la extensión como un vector de divulgación científica y desarrollo profesional en el curso de Ingeniería de Materiales.

Palabras clave: Extensión Universitaria. Ingeniería de Materiales. Escuela Secundaria. Industria. Redes Sociales.

1 INTRODUCTION

University extension is one of the structuring axes of higher education in Brazil, alongside teaching and research, promoting the exchange of knowledge between university and society and contributing to social, scientific, and technological development (Ramos et al., 2023; Chinelatto et al., 2006; File; Dantas; Silva, 2025). In the field of materials engineering, this approach is strategic, because, despite its relevance to sectors such as metallurgy, polymers, ceramics and biomaterials, the course remains little known by the general public, especially in the North Region. This low visibility is confirmed by two factors: the concentration of graduate programs in Metallurgical and Materials Engineering in the Southeast (53.3%), South (23.9%) and Northeast (18.5%), compared to only 3.3% in the North Region (CAPES, 2024); and limited social perception, since 81.4% of engineers and 68.1% of the Brazilian population consider engineering to be little or moderately recognized (CBIC, 2024).

In this context of growing industrial demand for qualified professionals and the need to expand knowledge about the possibilities and impacts of this area, it is essential to develop initiatives that clarify the role of the materials engineering course, increase its visibility, and encourage student participation in academic and scientific activities (Teixeira et al., 2023; Silva; Matos; Borges, 2023). The literature points out that university extension projects not only bring the institution closer to the community, but also strengthen the integral education of students by developing technical, social, and communication skills (Oliveira-Melo et al., 2025; Silveira et al., 2025). In addition, successful experiences at different universities show that activities such as lectures in schools, technical visits, workshops, and the use of social media arouse vocational interest, consolidate the image of the materials engineering course, and highlight its contribution to technological innovation and sustainable development (Federal University of São Carlos, 2023; DEMAUFSCAR, 2023; Federal University of Amazonas, 2023; Silva; Fernandes, 2025). Likewise, studies reinforce that actions planned in a democratic and participatory perspective, involving students, professors, and external partners, expand engagement and social impact (Lima; Dantas; Silva, 2025; Sakata; Peres, 2024).

Therefore, this work aims to present and analyze the actions developed by the Extension Project for the Promotion of the Materials Engineering Course of the School of Technology of the University of the State of Amazonas (PROJEMAT). Specifically, we sought to evaluate the impacts of lectures in high schools, technical visits to companies and

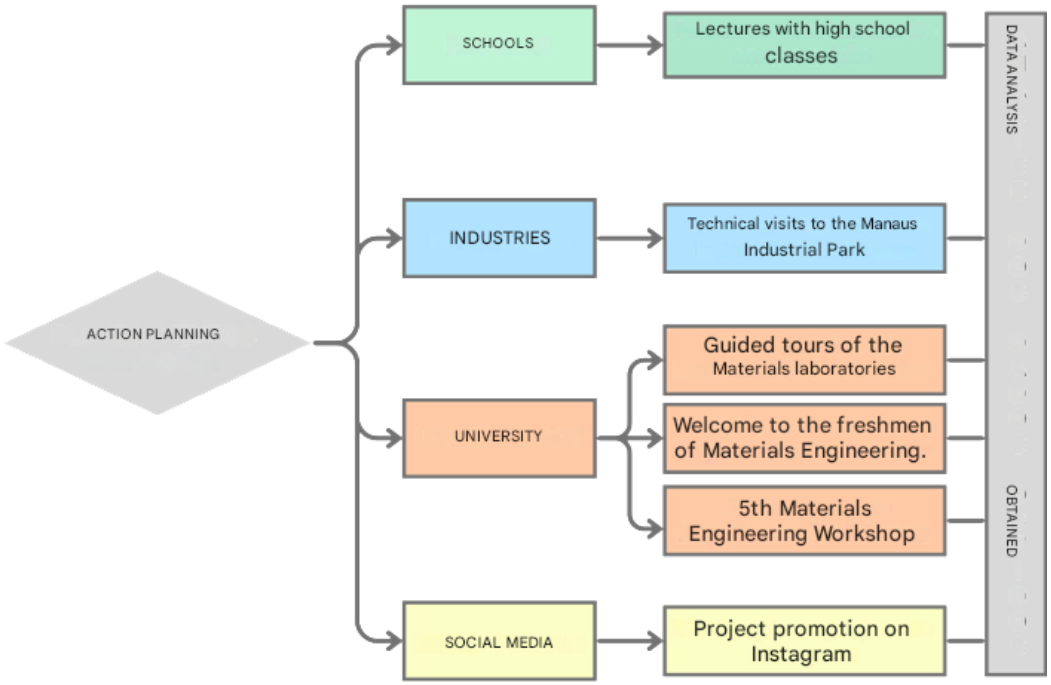
dissemination on social media, in order to measure the reach of the activities, the level of engagement of the academic community and the contribution of the project to the visibility of the course and to the understanding of its possibilities of professional performance.

2 METHODOLOGY

PROJEMAT's actions were planned in order to integrate schools, industries, universities and social networks (Figure 1), with the objective of publicizing the Materials Engineering course and expanding interaction with different audiences.

Figure 1

PROJEMAT methodological flowchart



Source: Prepared by the authors.

In public and private schools, interactive lectures were held with high school classes (1st, 2nd and 3rd grade), with an average duration of 45 to 50 minutes. The contents addressed the history of the course, areas of activity of the materials engineer, curricular structure, selection processes and academic opportunities. The activities were complemented by discussions to clarify doubts, a mid-level question and answer game and the delivery of personalized gifts to the participants.

In the industries Companhia de Bebidas das Américas – Ambev S.A., Tutiplast Indústria de Plásticos Ltda. and Conecthus Institute of Technology and Biotechnology of

Amazonas, technical visits were promoted with students from the first periods, allowing contact with fields of activity and professional possibilities linked to the Manaus Industrial Pole. These institutions represent a reference in their respective segments, evidencing the relevance of the integration between the course and large companies with regional impact.

At the university, guided tours were held, such as the one from the Ângelo Ramazzotti State School to the UEA School of Technology, to present the laboratories and the infrastructure of the course. The reception of freshmen was also organized, highlighting scientific initiation activities, monitoring, internships and other academic opportunities. In October 2023, during the National Week of Science and Technology, the PROJEMAT team organized the 5th Materials Engineering Workshop, an event that featured lectures by professionals who graduated from the course and technical mini-courses focused on processes and analyses applied in the area.

On social networks, especially through the Academic Center for Materials Engineering (CAEMAT), actions were carried out to publicize PROJEMAT and publications on the trajectory and consolidation of the course. Finally, the data obtained in all stages were analyzed to evaluate the impacts of the actions and the contribution of the project in the promotion of Materials Engineering.

3 RESULTS AND DISCUSSIONS

The project involved 815 high school students from public and private schools in Manaus-AM (Table 1); 18.7% were in the 1st year, 42.5% in the 2nd year and 38.8% in the 3rd year (Figure 2). Of the total number of finalists, five (1.58%) enrolled in the materials engineering course in the 2025/1 period, with the group composed exclusively of women. Despite the restricted initial knowledge about the course, the students showed growing interest during the presentations, actively participating in the question and answer game, an activity that included the delivery of gifts (Figure 3). University extension initiatives aimed at High School have a positive influence on arousing interest in the areas of Science, Technology, Engineering and Mathematics (STEM) and contribute to the motivation to enter higher education (Muller et al, 2025), as evidenced in PROJEMAT.

Table 1

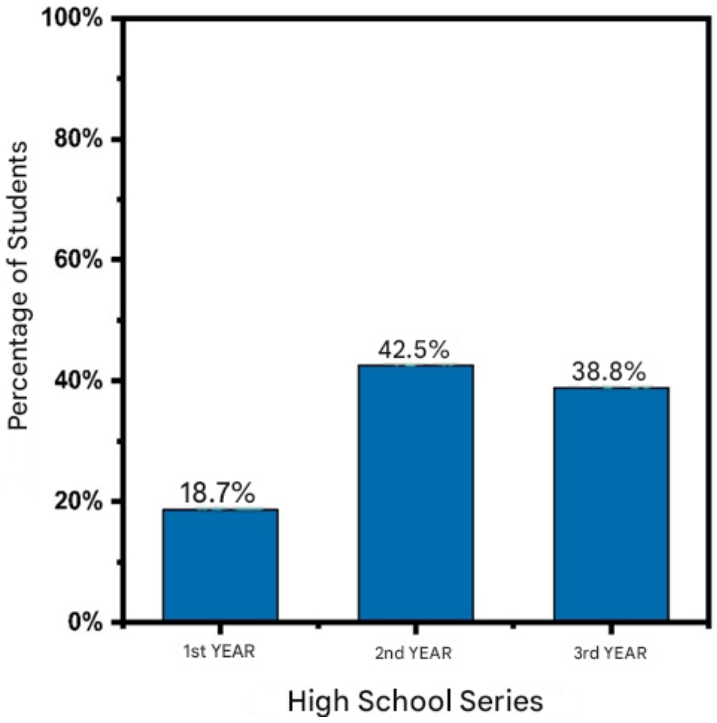
Distribution of High School Students by School and Grade

Schools	Year 1	Year 2	Year 3	
E.E. Ângelo Ramazzotti	69	69	41	
E.E. Vicente Telles de Souza	53	69	44	
E.E. Sólon de Lucena	0	127	74	
E.E. João Bosco Pantoja Evangelista	0	49	36	
Colégio Amazonense Dom Pedro II	0	0	109	
Don Bosco College	31	32	12	
Total students	**153**	**346**	**316**	**815**

Source: Prepared by the authors.

Figure 2

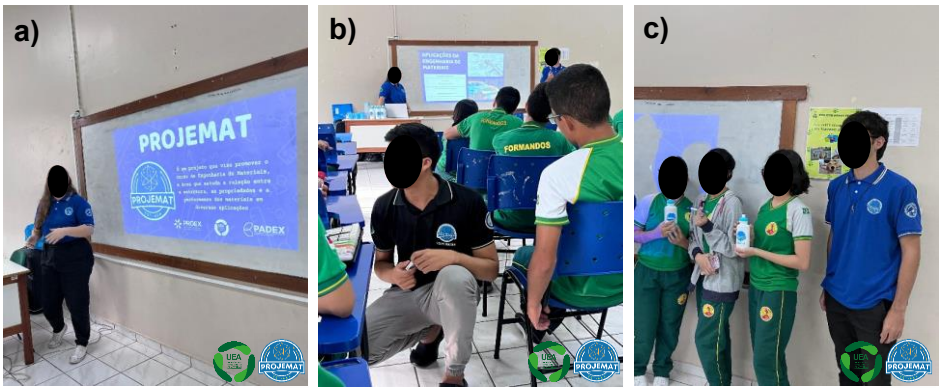
Percentage of students by grade level



Source: Prepared by the authors.

Figure 3

Lectures in schools: a) presentation of the project; b) interaction with students; c) delivery of gifts



Source: Prepared by the authors.

In the industries, three technical visits were carried out (Table 2), which registered a high demand for participation by the students. Membership, however, was restricted by the reception capacity of each company. It was also observed that many students in the initial periods of the night course were already inserted in the labor market, a factor that limited their availability for full participation in the activities.

Table 2

Distribution of Participants by Company Visited

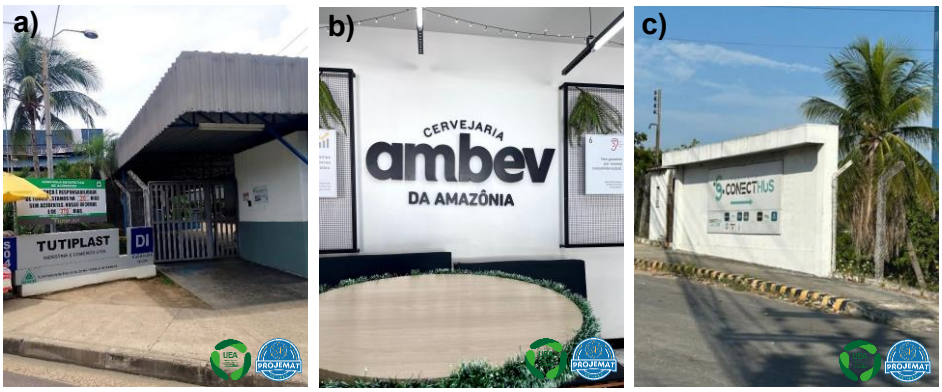
Companies Visited	Number of participants per company
Tutiplast Indústria e Comércio LTDA	10
Companhia de Bebidas das Américas - Ambev S.A	11
Conecthus Institute	5
Total participants	**26**

Source: Prepared by the authors.

The technical visits to the Tutiplast, Ambev S.A. and Conecthus Institute industries (Figure 4) allowed the students to observe the production processes, understand the areas of business activity and associate them with the theoretical knowledge learned in the classroom. As a result, some participants established contact with the companies visited and are now employed in them. These data reinforce the relevance of technical visits as an effective strategy to connect students to the professional environment, promoting practical integration and opportunities for insertion in the labor market (Raulino et al, 2024).

Figure 4

Technical visits to the companies of the Manaus Industrial Pole: a) Tutiplast; b) Ambev; c) Conecthus Institute



Source: Prepared by the authors.

The guided tour carried out with high school students (Figure 5) constituted an effective strategy for bringing basic education and higher education closer together. During the action, students had the opportunity to explore the academic facilities, including the laboratories of the materials engineering course, being introduced to equipment, research methodologies and technological applications pertinent to materials science. This experience provided direct contact with the university environment and scientific practice, which proved to be a determining factor in arousing curiosity, broadening the understanding of professional perspectives in the area and stimulating continuous interest in science and engineering. A recent study points out that actions similar to the results promote a positive impact on academic training, strengthening student engagement and contributing to regional scientific development (Rethman et al, 2020).

Figure 5

Guided tours with high school students to the Materials laboratories

Source: Prepared by the authors.

The reception of the students of the materials engineering course at the UEA School of Technology involved the presentation of the project, the academic center and the opportunities for monitoring and scientific initiation, followed by visits to the laboratories and facilities of the institution (Figure 6). The activity also included the delivery of institutional materials and moments of interaction between freshmen and veterans. It was observed that this initial approach favored the feeling of belonging and expanded the understanding of the academic and professional possibilities of the course. Such initiatives are associated with the reduction of student dropout, since they provide clear information about training, stimulate the motivation of freshmen, and promote integration with the academic community, in line with studies that demonstrate the positive impact of reception programs and institutional support on university permanence (Carneiro et al, 2024) and the relevance of strengthening the sense of belonging and academic engagement to increase student persistence (Hansen et al, 2023).

Figure 6

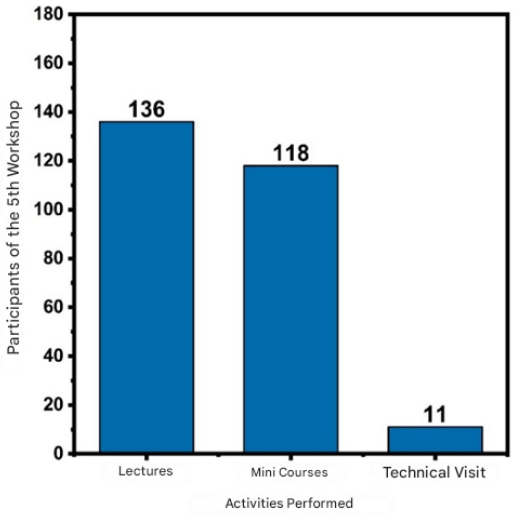
Welcome to the freshmen of Materials Engineering: a) presentation of the academic center; b) visit to the materials laboratories

Source: Prepared by the authors.

PROJEMAT, in partnership with CAEMAT, organized the 5th Materials Engineering Workshop, which was attended by 136 people in lectures, mini-courses and a technical visit (Figure 7). The activities promoted the engagement of the participants and contributed to the development of specific skills in the area. This result is in line with recent evidence that academic workshops favor active learning, broaden student engagement, and encourage the practical application of knowledge (Shipps et al, 2023).

Figure 7

Distribution of participants in the activities of the 5th Materials Engineering Workshop

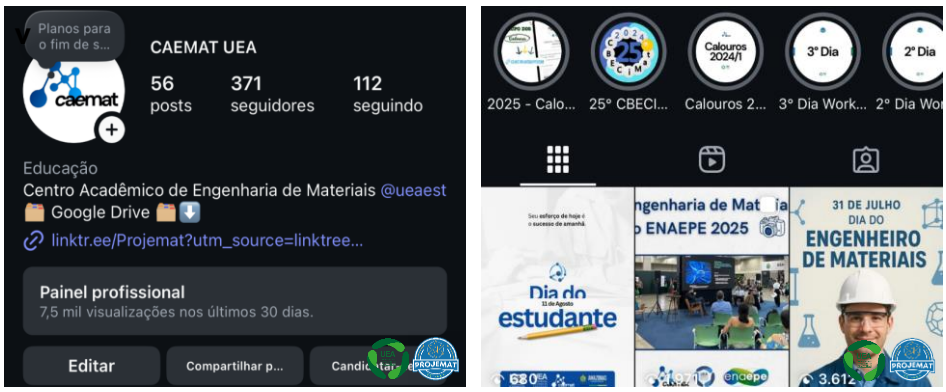


Source: Prepared by the authors.

Before the implementation of PROJEMAT, the dissemination of the Materials Engineering course occurred sporadically and restricted to the academic environment. With the execution of the project, this dissemination was expanded to different spaces, including schools, industries and social media (Figure 8). This expanded approach resulted in greater reach among students and contributed to improving the perception of the course, highlighting its possibilities for innovation and professional performance. Thus, it highlights the role of social media as a strategic tool to increase the visibility of undergraduate courses and strengthen communication with stakeholders (Santos et al, 2025).

Figure 8

Profile of the Academic Center for Materials Engineering (CAEMAT) on Instagram



Source: Prepared by the authors.

4 CONCLUSION

PROJEMAT was an effective initiative to bring the Materials Engineering course closer to society, establishing links between university, high schools and the industrial sector. The actions developed, such as lectures, technical visits, reception of freshmen, workshops and publications on social networks, aroused the interest of new students and contributed to maintaining the engagement of those already enrolled. In this sense, the involvement of more than eight hundred students and partnerships with large companies reinforce the relevance of linking academic training to the professional environment and expanding the feeling of student belonging.

In summary, the results achieved reveal different contributions to society and academia. In the context of society, it was observed the direct entry of students from the schools visited in the course and the insertion of academics in the companies, demonstrating the impact of extension on professional choice and employability. In the academic field, the

project strengthened the integration between theory and practice, promoted the development of technical, social and communicational skills, consolidating Materials Engineering as a strategic area in university education.

Despite the advances, the survey presented some limitations, especially regarding the difficulties in scheduling with schools, the barriers to the team's locomotion and the delay in the transfer of financial support, which reduced the scope of the actions. Finally, this work represented an initial research on the results and importance of extension in the materials engineering course, and it is necessary in future studies to carry out a broader mapping, in order to reach a greater number of schools, especially public ones. Such measures can enhance the social and academic impact of the project, expanding its contribution to the dissemination of Materials Engineering and to the training of new professionals.

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