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Development of soft and hard skills with a better employability vision for engineering students

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This study explores how participation in research projects can enhance both soft and technical skills among engineering students, contributing to greater employability. Students developed key competencies such as teamwork, leadership, responsibility, and technical proficiency by integrating problem-based learning methodologies into research initiatives. Survey results indicated high levels of self-reported improvement in these skills and increased academic motivation. The findings suggest that involving students in structured research projects offers a valuable pathway to address employability gaps in engineering education.

KEYWORDS

hard skills, problem-based learning, soft skills, T educational methodology, employability

1 Introduction

In response to global health and economic changes, the increasing unemployability of graduates and limited opportunities have led engineering schools to promote employability (Pulido, 2017). Thus, the development of both soft and hard skills is necessary to be able to incorporate them into the job market (García-Blanco and Cárdenas Sempértegui, 2018). Hard skills refer to the core, domain, and technical skills (Rao, 2014). Soft skills such as teamwork, communication, and persistence are widely recognized by both employers and college students. However, some skills, such as good communication, are often taken for granted and considered "common sense" (Hora et al., 2018). Therefore, active methods such as problem-based learning, project-based learning, case studies, and simulations support the development of soft skills, such as leadership capabilities (Knowles, 1975; Slavin, 1990; Brown and Akins, 2002; Duch et al., 2001; Gallar Pérez et al., 2017). However, the development of capabilities such as leadership and management should be systematically supported by educators (Marshall et al., 2011), as the cognitive and motivational processes are directly and inseparably connected (Cabanach, 2002; Wood, 2003). In this sense, problem-based learning (PBL) is a learner-centered instructional approach in which students work collaboratively to solve complex, real-world problems that do not have a single correct answer. Through this process, students conduct research, integrate theory and practice, and apply their knowledge and skills to develop viable solutions, with the teacher acting as a facilitator rather than a direct source of information (Hmelo-Silver, 2004; Ali, 2019). The key benefits that student-centered learning provides are to shift the focus from teacher-led instruction to student-driven inquiry and problem-solving. In this model, students work in teams to identify learning needs, share knowledge, and solve problems together. Instructors guide and support students instead of directly providing answers. The problems are authentic, real-world scenarios that require critical thinking and do not have a single solution. Students identify gaps in their knowledge, seek out resources, and take responsibility for their learning. PBL also encourages the application of theoretical knowledge to practical situations (Hmelo-Silver, 2004; Ali, 2019; Savery, 2006; Jaganathan et al., 2024).

On the other hand, the benefits of PBL include enhancing students' ability to analyze and solve complex problems, while group work fosters teamwork and communication skills. Students also develop self-directed learning habits and intrinsic motivation, which prepare them for continuous learning. PBL is associated with better long-term knowledge retention and the ability to apply knowledge in new contexts. Additionally, students gain flexible knowledge and critical thinking abilities that are valuable in professional and real-life situations (Hmelo-Silver, 2004; Ali, 2019; Jaganathan et al., 2024; Yew and Goh, 2016; Capon and Kuhn, 2004). Furthermore, several studies have shown that PBL is more effective than traditional teaching methods for promoting long-term knowledge retention and the application of knowledge (Hmelo-Silver, 2004; Ali, 2019; Jaganathan et al., 2024; Yew and Goh, 2016; Capon and Kuhn, 2004; Lonergan et al., 2022). In this way, the following principles are used to identify issues within a scenario to increase knowledge and understanding:

1. Learner-driven self-identified goals and outcomes.
2. Students engage in independent, self-directed study before returning to the larger group.
3. Learning is done in small groups of 8–10 people, with a tutor facilitating discussion.
4. Trigger materials such as paper-based clinical scenarios, lab data, photographs, articles, videos, or patients (real or simulated) can be used.
5. The Maastricht 7 jump process helps to guide the PBL tutorial process.
6. Based on the principles of adult learning theory.
7. All members of the group have a role to play.
8. Knowledge acquisition through combined work and intellect.
9. Enhanced teamwork and communication, problem-solving, and the encouragement of independent responsibility for shared learning of all essential skills for future practice.
10. Anyone can do it as long as it is right, depending on the given causes and scenario.
11. We can be champions and holders of vocational degrees.
12. It depends on the cases and the scenario of the building of the curriculum lesson.

Furthermore, the elaboration of projects is related to the continuous improvement of learning by facilitating the students' learning process of rational working methods, planning, creativity, assessment of results, learning autonomy, and development of cooperative projects (Marshall et al., 2011; Cabanach, 2002; Yew and Schmidt, 2012; Schmidt et al., 2007). Therefore, problem-based learning uses inquiry and constructivist learning to emphasize collaborative and self-directed learning with the following process:

1. Learners are presented with a problem and, through discussion within their group, activate their prior knowledge.
2. Within their group, they develop possible theories or hypotheses to explain the problem. Together, they identify the learning issues to be researched. They construct a shared primary model to explain the problem at hand. Facilitators provide scaffolding, a framework for students to construct knowledge relating to the problem.
3. After initial teamwork, students work independently in self-directed study to research the identified issues.
4. Students re-group to discuss their findings and refine their initial explanations based on what their learning.

Thus, the PBL focuses on challenging the learning process rather than only providing knowledge (Hmelo-Silver and Barrows, 2006), allowing students to be part of the social knowledge construction by building a personal interpretation of the surrounding world from their point of view based on experience and interaction (Dolmans et al., 2005).

The theoretical foundation of this study is grounded in three main domains: problem-based learning (PBL), employability theory, and skill development. PBL is rooted in constructivist learning theory, emphasizing student-centered, inquiry-based learning that fosters deep understanding and skill acquisition through real-world problem-solving (Hmelo-Silver, 2004). It promotes active engagement, collaboration, and reflective thinking, which are critical to developing cognitive and interpersonal competencies (Dolmans et al., 2005). Employability theory, as proposed by Yorke and Knight, underscores the importance of developing a blend of knowledge, skills, and attributes—often referred to as the 'USE' model (Understanding, Skills, and Efficacy beliefs)—to increase graduates' career readiness (Yorke and Knight, 2006). In the context of engineering education, skill development includes both domain-specific (technical) skills and transferable (soft) skills that align with the evolving needs of the labor market (Male et al., 2011). These theoretical perspectives underpin the rationale for embedding PBL and research projects in engineering curricula to enhance employability outcomes.

The study is guided by the hypothesis that active engagement in research projects, grounded in problem-based learning principles, will significantly improve students' self-perceived employability skills, including teamwork, leadership, and domain-specific knowledge.

Therefore, the objective of the present research is to analyze the implications of research projects on the development of students in the investigation hotbed stage and the development of methodological tools to improve knowledge acquisition, allowing them to develop abilities that help them to have better employability opportunities. Regarding this, it has been reported that STEM graduates lack appropriate employability skills and work experience (Carpenter et al., 2022). Furthermore, while previous studies have highlighted the role of PBL in skill development, limited empirical evidence exists on how participation in structured research projects influences both soft and technical skills in engineering students within Latin American higher education contexts. This study aims to address this gap.

2 Materials and methods

The survey used in this study was developed based on a review of existing employability skills frameworks, including the studies of Rao (2014) and Hora et al. (2018), to ensure relevance and content validity. Before full implementation, the instrument was piloted with a small group of students not included in the final analysis. Feedback from the pilot was used to refine question clarity and alignment with the study's objectives. This process helped confirm face validity and the appropriateness of survey items for measuring perceived skill development.

Participants were selected using purposive sampling, targeting students actively participating in at least one engineering research project during their undergraduate or graduate studies. This approach was chosen to ensure that the sample reflected individuals with direct experience relevant to the study's objective of evaluating skill development through research. Purposive sampling is widely accepted in educational research for its focus on specific characteristics aligned with research goals (Creswell and Clark, 2017). Additionally, this method aligns with approaches in prior employability studies that focused on students involved in experiential learning or project-based initiatives (Andrews and Higson, 2008). The small sample size is consistent with similar exploratory studies aiming to assess perception-based data and inform future research with broader cohorts.

In terms of statistical analysis, the study applied descriptive statistics to interpret the survey responses. Specifically, mean percentages were employed to summarize the frequency and distribution of responses across each survey item. This method is appropriate for small sample sizes and is commonly used in exploratory educational research to capture central trends (Rao, 2014; Carpenter et al., 2022).

The participant pool consisted of 22 engineering students (16 undergraduates and 6 graduates) from the Mechanical Engineering program at SEK International University. These students were selected based on their voluntary engagement in extracurricular research projects under faculty supervision. The research activities were designed to complement curricular instruction by applying theoretical concepts in practical environments. This model reflects best practices in engineering pedagogy that advocate integrating authentic research opportunities into the undergraduate and graduate experience to reinforce academic learning and increase career readiness (Rowland, 2006). Student participation was facilitated through designated research hotbeds recognized within the university's educational innovation framework.

The research considers Mechanical Engineering students from the Engineering Faculty of SEK International University who are interested in the investigation field and are recognized as the research incubator. Thus, the following projects were selected from the interest of the students:

- Promotion of industry in Ecuador through the selection and characterization of materials.
- Validation of prototypes for exterior illumination using LED high-power technology: field tests.
- Development of algorithms for search agents and environmental modification, emulating hive behavior.

Thus, the students participating in the related projects completed a survey that explored the development of soft skills, hard skills, motivation, and research abilities. At the same time, the tabulation of the results used a numerical scale, from 1 (very little) to 5 (a great deal). The questions are detailed as follows:

The survey comprised four core sections: (1) research abilities, (2) soft skills, (3) technical (hard) skills, and (4) motivation. Each section included multiple Likert-scale questions (ranging from 1 = very little to 5 = a great deal) intended to measure perceived changes resulting from research participation. The soft skills section included responsibility, teamwork, problem-solving, self-confidence, and leadership, while the technical skills section focused on programming, CAD, and materials science. The motivation section assessed changes in students' academic enthusiasm and willingness to recommend research engagement to peers. Descriptive statistics were calculated for each item using mean and percentage agreement levels to capture overall trends, using the following survey:

- Research abilities

Do you consider that being part of a research group has developed your research abilities in the following areas?

a) Academic search for information related to the investigation topic.

b) Engineering application and design, applied to a project.

c) Use of the scientific method in the project development.

- Soft abilities

Do you consider that your participation in a research project has contributed to the development of the following soft skills?

(a) Responsibility.
(b) Teamwork.
(c) Capacity to solve problems.
(d) Personal security.
(e) Assertiveness.
(f) Self-organization capacity.
(g) Leadership.

- Hard abilities

a) Do you consider that your work in a research project has contributed to your abilities in any of the subjects or projects from your curriculum?

b) In how many subjects do you consider you have been able to increase your abilities and knowledge?

c) Mention at least three subjects you consider to have directly impacted the research project.

- Motivation

a) In your opinion, after being part of a research project, has your motivation for studies diminished, remained the same, or increased?

b) Would you recommend that your classmates participate in a research project?

3 Results and discussion

The development of soft and hard skills has been shown to allow better possibilities regarding the promotion of employability. In this context, analyzing the interest of students in research subjects that help to develop these skills, the results of the exploratory study involved 16 students out of 22, where 75% of them were undergraduates and 25% were graduates.

In this way, the results show that the theme of industrial promotion through materials got 37.5% of acceptance, while LED high power technology and environmental modification development through algorithm showed 31.5%.

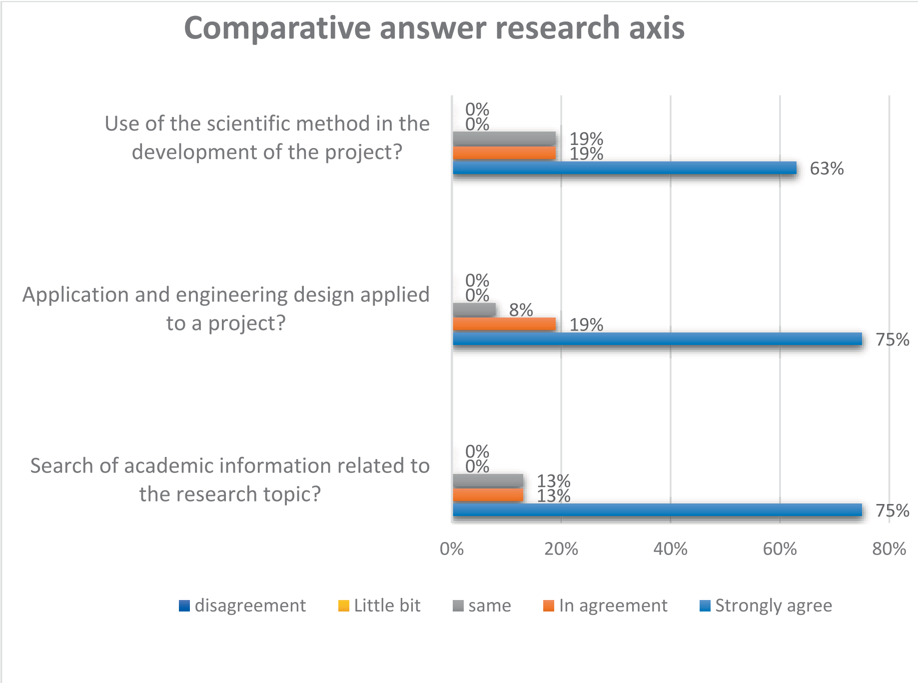

FIGURE 1
Bar chart representing student agreement with statements on research-related learning outcomes.

Regarding the core idea of research, Figure 1 shows that considering it as a strongly agreed answer, 63% of the participating students in the research project had improved their learning and application of the scientific method.

Building on the previous discussion, Figure 1 highlights that over 60% of students strongly agreed that their ability to apply the scientific method and conduct academic research improved due to project involvement. This supports the findings by Yew and Schmidt (2012), who demonstrated that problem-based learning environments enhance learners' ability to apply conceptual knowledge through inquiry.

On the other hand, the results from the soft skills are displayed in Figure 2, showing that every student has developed a soft skill better, agreed, or strongly agreed. Thus, the skill that had the most important impact was the skill of responsibility, one of the most important abilities that employers search for. Therefore, students have better chances of being employed.

Figure 2 illustrates the high degree of agreement on developing soft skills, particularly responsibility and teamwork. These outcomes align with the framework proposed by Rao (2014), which emphasizes the role of experiential activities in fostering leadership and communication skills crucial for engineering graduates.

In addition to the technical competencies regarding technical skills, the students agreed positively (94%) that participation in the research project helped them to develop their technical capabilities, as can be seen in Figure 3. In this context, 75% of respondents reported substantial improvement in applying engineering design, along with academic information research. With 94%, the results show that the findings are consistent with other studies highlighting the formative role of hands-on project experience in boosting employability attributes (Male et al., 2010; Patil and Pudlowski, 2007). The consistent positive perception across categories indicates that research participation facilitates integrated skill development, an increasingly emphasized outcome in engineering education (Arrowsmith et al., 2011). These results show an important growth in students' employability, since employment capability is defined as the right assembly of specific knowledge, personal attributes, and technical competencies (Arrowsmith et al., 2011). In contrast, it has been reported that Vietnamese graduate students have felt "not ready to work" after graduation due to the weakness in the development of soft skills, a fact that was also observed by employers (Tran, 2013), showing the importance of these results. Furthermore, this resonates with the findings of Patil and Pudlowski (2007), who expressed the importance of integrating technical training with real-world research to produce industry-ready graduates.

Similarly, regarding the students' improvement in academic subjects, how many of them managed to improve their skills and knowledge in programming, electrotechnical subjects, CAD, and materials science? The survey results shown in Figure 4 demonstrate that it influenced three or more subjects. In the same way, an Indian analysis concluded that the most generic skills and essential attributes for modern engineers are appropriate technical knowledge and a positive attitude (Mishra, 2016). In this regard, alongside the development of technical skills, engineers' capabilities are developed along with employment opportunities.

Figure 4 provides evidence that students could transfer skills gained in research projects to multiple academic subjects, especially in core areas such as programming and CAD. This finding is consistent with that of Arrowsmith et al. (2011), who argue that the interdisciplinary application of knowledge is key to employability.

Figure 5 shows increased motivation and peer recommendation following research involvement, indicating that such experiences

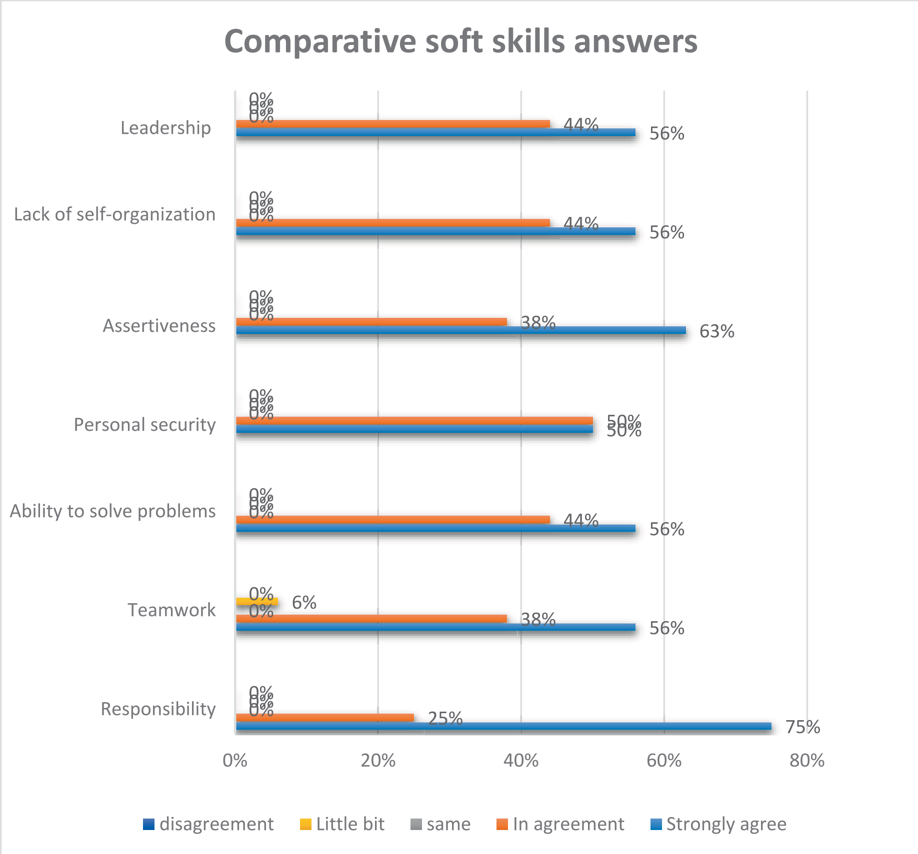

FIGURE 2
Bar chart depicting development of various soft skills among participants.

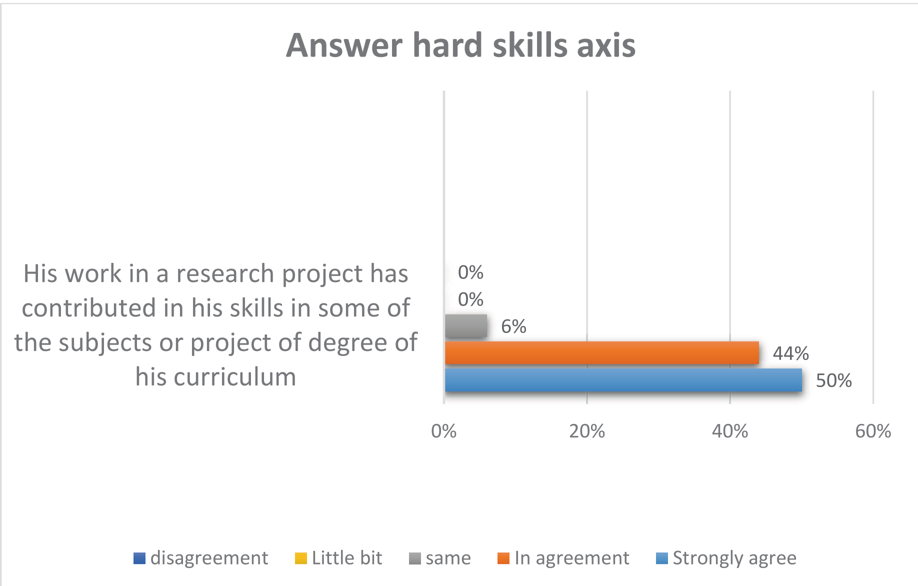

FIGURE 3
Bar chart summarizing agreement on the enhancement of technical capabilities through research participation.

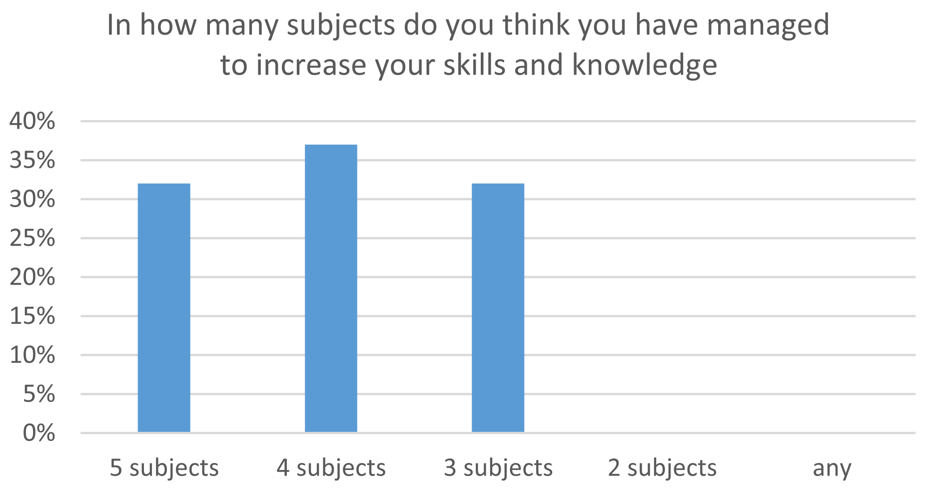

FIGURE 4
Distribution of students by the number of academic subjects impacted by their research participation.

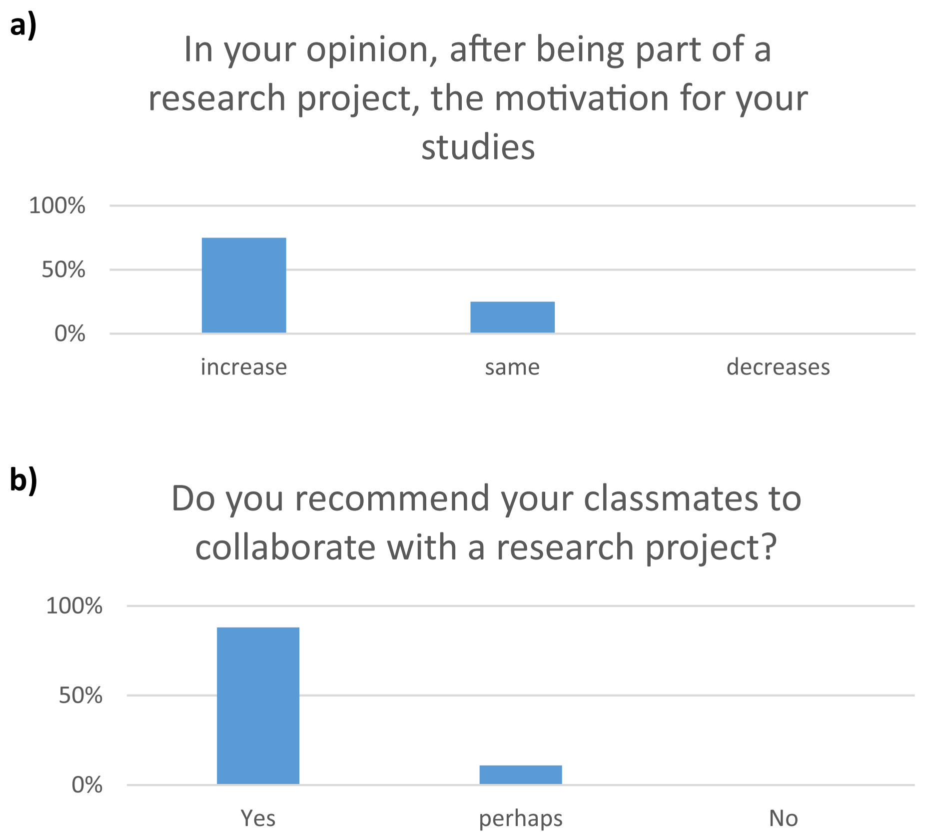

FIGURE 5
Summary of student responses post-research involvement **(a)** responses on motivation **(b)** responses on recommendations.

promote a positive academic mindset. Carpenter et al. (2022) also highlighted motivation as a critical outcome of undergraduate research engagement.

These findings reinforce the importance of integrating practical learning into academic environments. Considering the students' motivation after participating in the projects, the results—shown in Figure 5—indicate that most of the respondents reported increased motivation and a greater willingness to recommend research projects to their classmates. This reflects a positive attitude, which is recognized as an important skill in the field of engineering (Mishra, 2016). Therefore, the development of motivation also shows important progress in reaching the workplace since the ability and possibilities of people to implement their skills, along with their education and experience, does not mean that their potential will be exploited; this realization is driven by individual motivation and a willingness to collaborate with others (Lapiņa and Ščeulovs, 2014).

Therefore, pilot studies have revealed that students are confident in learning the required hard and soft skills, and some others will need guidance and assistance to learn some skills; for example, it could be possible to learn technical skills, but they may have difficulty with social skills (Pieterse and van Eekelen, 2016).

These findings align with existing literature that underscores the critical role of soft and hard skills in enhancing employability in STEM disciplines. Studies have shown that engineering graduates often lack essential non-technical skills, such as communication, teamwork, and adaptability, which are highly valued by employers in technical fields (Rao, 2014; Hora et al., 2018). As demonstrated in this study, the integration of problem-based learning and participation in research projects supports the development of these competencies in a real-world context. Furthermore, the reported increase in student motivation corroborates Carpenter et al. (2022) findings, which link engagement in undergraduate research to enhanced confidence and career readiness. As such, embedding experiential learning opportunities within engineering curricula appears essential for bridging the gap between academic training and industry expectations (Tran, 2013; Mishra, 2016).

4 Conclusion

Participation in structured research projects significantly supports the development of both soft and technical skills, which are vital for enhancing the employability of engineering graduates. Survey results revealed substantial perceived gains in leadership, teamwork, problem-solving, and subject-specific knowledge. These competencies are increasingly recognized as essential by industry, and integrating research-based experiential learning into the curriculum can help bridge the gap between academic preparation and professional expectations. Future studies should include larger sample sizes and comparative analyses to validate these outcomes further.

Future research should consider employing larger, more diverse samples across multiple institutions to enhance generalizability. Longitudinal studies tracking actual employment outcomes and employer feedback could provide further validation of the impact of research project involvement. Comparing PBL-integrated research approaches across disciplines may reveal nuanced differences in skill acquisition trajectories.

This study contributes to the growing knowledge of engineering education by empirically examining how participation in research projects fosters both soft and technical skill development. It highlights the value of embedding structured, problem-based research experiences within the engineering curriculum to improve students' employability. The findings offer practical insights for educators and curriculum designers seeking to align academic training with industry expectations.

In this research, the effects of student participation in research projects were analyzed through surveys to improve the learning focus in engineering education. The survey methodology provided valuable insight into students' perceptions.

In all cases, the answers from the soft-skills core idea showed that the perception from the student's side is a total agreement or agreement in improving abilities such as leadership, self-organization capacity, assertiveness, self-confidence, problem-solving capacity, teamwork, and responsibility.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

JM-G: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft. JN: Data curation, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

Publisher's note

References

Ali, S. S. (2019). Problem based learning: a student-centered approach. *Engl. Lang. Teach.* 12:73. doi: 10.5539/elt.v12n5p73

Andrews, J., and Higson, H. (2008). Graduate employability, 'soft skills' versus 'hard' business knowledge: a European study. *High. Educ. Eur.* 33, 411–422. doi: 10.1080/03797720802522627

Arrowsmith, C., Bagoly-Simó, P., Finchum, A., Oda, K., and Pawson, E. (2011). Student employability and its implications for geography curricula and learning practices. *J. Geogr. High. Educ.* 35, 365–377. doi: 10.1080/03098265.2011.563379

Brown, G., and Akins, M. (2002). Effective teaching in higher education. London: Routledge.

Cabanach, R. G. (2002). *Aspectos históricos, explicativos y metodológicos*.

Capon, N., and Kuhn, D. (2004). What's so good about problem-based learning? *Cogn. Instr.* 22, 61–79. doi: 10.1207/s1532690Xci2201_3

Carpenter, L., Nguyen, B., Davis, L., and Rowland, S. (2022). The undergraduate research experience as a vehicle for employability development—the student participants speak. *Biochem. Mol. Biol. Educ.* 50, 65–74. doi: 10.1002/bmb.21586

Creswell, J. W., and Clark, V. L. P. (2017). Designing and conducting mixed methods research. *3rd* Edn. Thousand Oaks: SAGE Publications.

Dolmans, D. H. J. M., De Grave, W., Wolfhagen, I. H. A. P., and van der Vleuten, C. P. M. (2005). Problem-based learning: future challenges for educational practice and research. *Med. Educ.* 39, 732–741. doi: 10.1111/j.1365-2929.2005.02205.x

Duch, B. J., Groh, S. E., and Allen, D. E. (2001). The power of problem based learning. New York: Stylus.

Gallar Pérez, Y., Barrios Queipo, E. A., Chávez Rivera, M. E., and Rodríguez Zaldívar, I. E. (2017). *Alternativas de metodologías activas en el marco del proyecto, mejora del proceso de enseñanza aprendizaje desde acciones pedagógicas y didácticas en la Universidad Internacional SEK. UISEK*.

García-Blanco, M., and Cárdenas Sempértegui, E. B. (2018). La inserción laboral en la educación superior. La perspectiva latinoamericana. *Educación XX1* 21:209. doi: 10.5944/educxx1.16209

Hmelo-Silver, C. E. (2004). Problem-based learning: what and how do students learn? *Educ. Psychol. Rev.* 16, 235–266. doi: 10.1023/B:EDPR.0000034022.16470.f3

Hmelo-Silver, C. E., and Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdiscip. J. Probl.-Based Learn.* 1:1004. doi: 10.7771/1541-5015.1004

Hora, M. T., Benbow, R. J., and Smolarek, B. B. (2018). Re-thinking soft skills and student employability: a new paradigm for undergraduate education. *Change* 50, 30–37. doi: 10.1080/00091383.2018.1540819

Jaganathan, S., Bhuminathan, S., and Ramesh, M. (2024). Problem-based learning – an overview. *J. Pharm. Bioallied Sci.* 16, S1435–S1437. doi: 10.4103/jpbs.jpbs_820_23

Knowles, M. (1975). Self-directed learning: A guide for learners and teachers. Westchester, Illinois: Follett Publishing Company.

Lapiņa, I., and Ščeulovs, D. (2014). Employability and skills anticipation: competences and market demands. *Procedia. Soc. Behav. Sci.* 156, 404–408. doi: 10.1016/j.sbspro.2014.11.211

Lonergan, R., Cumming, T. M., and O'Neill, S. C. (2022). Exploring the efficacy of problem-based learning in diverse secondary school classrooms: characteristics and goals of problem-based learning. *Int. J. Educ. Res.* 112:101945. doi: 10.1016/j.ijer.2022.101945

Male, S. A., Bush, M. B., and Chapman, E. S. (2010). *Understanding generic engineering competencies*. in 21st Annual Conference for the Australasian Association for Engineering Education, Sydney.

Male, S. A., Bush, M. B., and Chapman, E. S. (2011). An Australian study of generic competencies required by engineers. *Eur. J. Eng. Educ.* 36, 151–163. doi: 10.1080/03043797.2011.569703

Marshall, S. J., Orrell, J., Cameron, A., Bosanquet, A., and Thomas, S. (2011). Leading and managing learning and teaching in higher education. *High. Educ. Res. Dev.* 30, 87–103. doi: 10.1080/07294360.2010.512631

Mishra, D. S. (2016). Engineering employability skills required by employers in India. *Int. Res. J. Eng. Technol.* 3, 961–964.

Patil, A. S., and Pudlowski, Z. J. (2007). Important issues of development of engineering education in the twenty-first century. *Glob. J. Eng. Educ.* 11, 165–172.

Pieterse, V., and van Eekelen, M. (2016). *Which are Harder? Soft Skills or Hard Skills?* Annual Conference of the Southern African Computer Lecturers' Association, pp. 160–167.

Pulido, W. (2017). *Educación superior y desarrollo socioeconómico: utopía o realidad para jóvenes de bajos recursos de Bogotá*. Universitat Autònoma de Barcelona, Barcelona.

Rao, M. S. (2014). Enhancing employability in engineering and management students through soft skills. *Ind. Commer. Train.* 46, 42–48. doi: 10.1108/ICT-04-2013-0023

Rowland, S. (2006). The enquiring university. New York: McGraw-Hill Education.

Savery, J. R. (2006). Overview of problem-based learning: definitions and distinctions. *Interdiscip. J. Probl. Based Learn.* 1:1002. doi: 10.7771/1541-5015.1002

Schmidt, H. G., Loyens, S. M. M., VAN Gog, T., and Paas, F. (2007). Problem-based learning is compatible with human cognitive architecture: commentary on Kirschner, Sweller, and Clark (2006). *Educ. Psychol.* 42, 91–97. doi: 10.1080/00461520701263350

Slavin, R. E. (1990). Cooperative learning: Theory, research and practice. Englewood Cliffs: Prentice-Hall.

Tran, T. T. (2013). Limitation on the development of skills in higher education in Vietnam. *High. Educ. (Dordr.).* 65, 631–644. doi: 10.1007/s10734-012-9567-7

Wood, D. F. (2003). ABC of learning and teaching in medicine: problem based learning. *BMJ* 326, 328–330. doi: 10.1136/bmj.326.7384.328

Yew, E. H. J., and Goh, K. (2016). Problem-based learning: an overview of its process and impact on learning. *Health Prof. Educ.* 2, 75–79. doi: 10.1016/j.hpe.2016.01.004

Yew, E. H. J., and Schmidt, H. G. (2012). What students learn in problem-based learning: a process analysis. *Instrum. Sci.* 40, 371–395. doi: 10.1007/s11251-011-9181-6

Yorke, M., and Knight, P. T. (2006). Embedding employability into the curriculum: Learning & Employability Series 1. New York: The Higher Education Academy.