Navigating the soft skills challenge in AI-mediated technical higher education: ESTO as a case study

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RESUME

Cette étude examine l'intégration des compétences transversales au sein des cursus techniques de l'ESTO, en réponse aux exigences croissantes en matière de communication et de pensée critique dans un contexte marqué par l'intelligence artificielle. À travers une méthodologie qualitative s'appuyant sur des interventions pédagogiques orales et écrites, la recherche analyse la manière dont les étudiants (N = 191) s'approprient ces aptitudes essentielles. Les résultats mettent en évidence des lacunes notables dans l'articulation conceptuelle et une dépendance accrue aux outils d'IA, ce qui limite la production d'une pensée originale et autonome. Le travail conclut sur la nécessité d'une reconfiguration des pratiques d'enseignement par une conception curriculaire intentionnelle et une révision des modalités d'évaluation. Une telle approche s'avère indispensable pour doter les diplômés des capacités cognitives et interpersonnelles nécessaires à l'évolution dans un environnement professionnel complexe et automatisé.

ABSTRACT

This paper explores the integration of soft skills into higher education curricula, especially in response to the need for communication, teamwork, and critical thinking in an AI-driven world. Drawing on teaching and observation experiences at ESTO (École Supérieure de Technologie Oujda), a qualitative methodology was deployed to examine how students (N = 191) in technical programs engage in tasks like oral presentations and critical writing. The findings indicate that many students struggled with articulating ideas, understanding key concepts, and developing independent solutions, with some patterns resembling AI-generated content. This highlights gaps in soft skills development in technical programs. The study advocates for reshaping teaching practices to prioritize soft skills through intentional curriculum design, interdisciplinary collaboration, and revised assessment strategies to better prepare students for a complex professional landscape.

MOTS-CLÉS : soft skills, enseignement supérieur, recherche pédagogique, apprentissage via IA
Keywords: soft skills, higher education, classroom-based research, AI-mediated learning

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1 Introduction

The rapid expansion of automation and Artificial Intelligence (AI) is reshaping contemporary higher education, particularly within technical institutions. As digital tools increasingly mediate academic work, students are expected not only to master disciplinary knowledge but also to demonstrate adaptability, communication competence, and critical reasoning in response to evolving professional demands. While considerable attention has been given to the transformation of technical competencies, less empirical attention has been devoted to how AI-mediated learning environments influence the development and actual use of soft skills in classroom practice.

Despite growing recognition of their critical role in professional success, soft skills are still frequently downplayed in many technical education programs. This paper examines the specific ways in which these essential interpersonal skills—such as communication, teamwork, and critical thinking—are integrated into, or often overlooked in, classroom practices. Drawing on teaching experience at ESTO, an institution specializing in technical education, the analysis highlights both the challenges and opportunities associated with fostering a well-rounded skill set in students. By evaluating curriculum frameworks and instructional methods, this study aims to illuminate the importance of soft skills in preparing undergraduates for the complexities of today's workforce.

Soft skills, often referred to as the essential competencies of the 21st century, encompass a diverse array of interpersonal and cognitive abilities that are vital to professional success. Esteemed scholars such as Dell'Aquila et al. (2017) and Bhatnagar and Bhatnagar (2012) underscore the significant impact of these skills on crucial aspects such as employability, leadership, and adaptability. By fostering effective communication, emotional intelligence, teamwork, and problem-solving, individuals can navigate the complexities of the modern workplace and enhance their potential to thrive in dynamic environments. The literature categorizes soft skills into clusters such as the 4 Cs (communication, collaboration, critical thinking, and creativity), IMT (information, media, and technology literacy), and FLIPS (flexibility, leadership, initiative, productivity, and social skills). While these categorizations offer useful taxonomies, the practical enactment of such skills in AI-mediated academic settings remains underexplored, particularly within technical higher education in Morocco.

In Morocco, recent policy initiatives have aimed to integrate soft skills into curricula; however, their systematic implementation and assessment remain inconsistent (Agliz, 2024). This qualitative case study examines how students in technical programs at ESTO engage with soft skills through structured classroom tasks, and how AI-mediated learning environments intersect with these engagements. Thus, the study is guided by a central research question: How do students in technical higher education programs engage with classroom tasks designed to develop communication, teamwork, and critical thinking skills within an AI-mediated academic environment? While previous studies have examined soft skills development or the pedagogical uses of artificial intelligence separately, fewer investigations have explored how AI-mediated academic practices intersect with the actual enactment of soft skills during classroom tasks. Empirical observations from technical institutions in Morocco remain scarce. By focusing on concrete classroom activities rather than curricular intentions alone, this study contributes qualitative evidence on how students navigate communication, collaboration, and reasoning in environments where AI tools are readily available. In doing so, the study pursues three main objectives:

a. To examine observable manifestations of communication, teamwork, and critical thinking during structured classroom activities.

b. To identify patterns of AI reliance in students' written and oral responses.

c. To analyze the pedagogical implications of these observations for soft skills integration in technical curricula.

2 Literature Review

2.1 Introducing Soft Skills

Soft skills—often framed as 21st-century skills—are commonly organized into three broad categories: Learning Skills (4 skills), Literacy Skills (3 skills), and Life Skills (5 skills). Together, they form what many scholars describe as the core competencies of career readiness. While some argue that this taxonomy is not exhaustive, these twelve skills remain the most widely recognized framework for preparing students to navigate both academic and professional environments.

The first category, Learning Skills, is encapsulated in the well-known "Four Cs": critical thinking, creativity, collaboration, and communication. These skills address the cognitive and interpersonal capacities required in contemporary workplaces. Among them, critical thinking is frequently considered foundational. It enables students to identify problems, evaluate competing ideas—including those presented by authority figures—and transform challenges into opportunities. Once internalized, this skill fosters intellectual autonomy and prepares learners to respond thoughtfully to real-world complexities.

Creativity complements critical thinking by encouraging students to move beyond habitual patterns and imagine alternative solutions. In rapidly evolving professional landscapes, innovation depends on the ability to question inherited practices and reconsider methods once deemed sufficient. Collaboration, though often more demanding, requires individuals to negotiate differences and work toward shared objectives. It calls for openness, compromise, and a willingness to integrate diverse perspectives. Communication, finally, acts as the connective force among the Four Cs. Whether in academic discussions or workplace exchanges, the ability to articulate ideas clearly and adapt them to varied audiences ensures that critical insight, creative thinking, and collaborative effort can function cohesively.

The second category, Literacy Skills, is commonly abbreviated as IMT: information, media, and technology literacy. These competencies respond to the realities of the digital age. Information literacy equips students to distinguish reliable data from misinformation, cultivating habits of verification and independent judgment. Media literacy extends this capacity by encouraging awareness of how information is produced, framed, and disseminated across platforms. It trains students to identify credible sources and recognize bias within increasingly saturated media environments. Technology literacy, in turn, focuses on understanding and effectively using digital tools—from computers and mobile devices to cloud-based systems. Rather than viewing technology as intimidating, students learn to engage with it critically and purposefully, recognizing both its affordances and its limitations.

The third category, Life Skills, sometimes summarized as FLIPS (Flexibility, Leadership, Initiative, Productivity, and Social Skills), bridges personal development and professional readiness. Flexibility demands adaptability and the humility to revise one's position when necessary—an especially challenging but essential quality in times of rapid change. Leadership centers on motivating others and fostering environments of trust and shared responsibility. It is closely tied to collaboration yet emphasizes direction and accountability. Initiative reflects the capacity to act independently and to transform ideas into concrete projects. Paired with initiative is productivity, understood as sustained efficiency and the ability to manage distractions while achieving meaningful outcomes. Finally, social skills integrate these attributes, emphasizing relationship-building, networking, and professional

etiquette. In an era shaped by both face-to-face and digital interaction, such relational competencies remain indispensable.

Taken together, these three categories illustrate that soft skills extend beyond abstract ideals. They represent an integrated framework through which students learn to think critically, act responsibly, and adapt confidently within complex social and technological landscapes.

2.2 The Importance of Soft Skills

Having classified the core 21st-century soft skills, their importance becomes difficult to dispute. Soft skills are not peripheral attributes; they are central to how individuals function in daily life and within professional settings. Scholars such as Wats (2009), Robles (2012), and Russell and Tastle (2005) consistently argue that employers—particularly in Western contexts—tend to prioritize candidates who demonstrate strong interpersonal and behavioral competencies alongside technical expertise. In many cases, such qualities determine hiring decisions.

As Dell'Aquila et al. (2017) observe, soft skills are closely linked to job performance and career development. They are essential for employees who must manage emotions, communicate effectively with clients, and align themselves with organizational missions. At the managerial level, these skills sustain leadership, guide teams toward shared objectives, and contribute to long-term institutional vision (p. 1). Their relevance, therefore, spans entry-level positions to executive leadership.

Across disciplines, there is broad agreement that soft skills foster both individual and collective growth. They encourage innovation across educational, vocational, and corporate environments. While curricula often prioritize STEM subjects—sometimes at the expense of interpersonal development—the labor market increasingly signals that technical mastery alone is insufficient. Soft skills function as transversal competencies, enabling individuals to apply knowledge meaningfully within complex human systems.

Evidence from employment studies reinforces this shift. A report published in *The Guardian* noted that employers seek more than credentials; they want candidates to articulate personal achievements and lived experiences that reveal character and adaptability. As Brett (2018) summarizes, nearly two-fifths of surveyed managers expressed a preference for applicants to place greater emphasis on so-called soft skills in their applications. Even major corporations such as Google and Facebook have identified these attributes as indicators of long-term success (Brett, 2018). Importantly, such competencies are not confined to the workplace. Dell'Aquila et al. (2017) emphasize that individuals are expected to perform effectively not only in professional contexts but also within social spheres (p. 3), underscoring the relational dimension of soft skills—both interpersonal and intrapersonal.

Empirical studies further demonstrate their significance during recruitment. Bhatnagar and Bhatnagar (2012) found that interpersonal skills were ranked as the most important factor in job interviews, whereas technical skills were placed considerably lower (p. 6). Another U.S.-based survey reported that nearly 70% of respondents rated soft skills as very important, a marked increase from earlier findings, suggesting a shifting professional landscape that increasingly values behavioral competencies across all organizational levels (Bhatnagar & Bhatnagar, 2012, p. 6).

This growing emphasis also reflects persistent employer concerns. Tulgan (2015) notes that managerial complaints about the soft skill deficiencies of young employees have steadily increased since the mid-1990s (p. 21). Frequently cited issues include weak work habits, limited critical thinking, lack of initiative, and insufficient self-awareness—traits that should ideally have been cultivated well before entry into the labor market. Such observations

prompt pressing questions: where and when are soft skills acquired? How are they effectively developed? And what responsibility do educational institutions, particularly teachers, bear in nurturing these competencies before students transition into professional life?

2.3 Soft Skills in Higher Education and Technical Disciplines

Despite increasing recognition of their importance, many higher education institutions continue to focus predominantly on hard skills—such as technical knowledge and specific professional competencies. This emphasis often comes at the expense of soft skills, like communication, teamwork, and critical thinking, which are typically relegated to co-curricular activities or informal learning contexts. Recent empirical research has moved beyond definition taxonomies to examine how these skills are cultivated and assessed within higher educational contexts. Systematic reviews demonstrate that although soft skills are widely acknowledged in curricular discourse, their structured implementation remains uneven across technical institutions (Aziz, 2025). These findings suggest that soft skills are not peripheral but integral to professional performance.

Parallel to this discussion is the growing presence of AI in academic settings. These tools increasingly mediate writing, research, and problem-solving processes, raising new questions about their impact on cognitive and interpersonal development. Emerging scholarship highlights AI's dual potential: it may support communication and collaborative work when integrated pedagogically; it may also reduce students' independent reasoning if used as a substitute for cognitive engagement (Hassan et al., 2025). This ambivalence underscores the need to examine how AI intersects with the use of soft skills, rather than assuming purely positive or purely negative outcomes.

Pedagogical innovation has been proposed as a solution to this challenge. Experimental methods, such as gamification and serious game design, have demonstrated the ability to enhance students' confidence, teamwork, and problem-solving skills, particularly when soft skills are deliberately integrated into structured learning activities (López-Serrano et al., 2025). Similarly, interdisciplinary approaches—such as incorporating humanities perspectives into engineering curricula—have been shown to promote ethical awareness, communication sensitivity, and human-centered thinking among technical students (Munir, 2025). These findings imply that the development of soft skills is most effective when it is intentionally designed, rather than assumed to occur incidentally.

As a result, a significant skills gap emerges, particularly evident when students make the transition from academic settings to the professional world. Employers frequently cite the lack of essential interpersonal skills as a barrier to effective collaboration and overall workplace success, highlighting the urgent need for a more balanced approach to education that integrates both hard and soft skills into the curriculum.

Despite the growing body of research, there has been limited empirical focus on classroom-level observations in North African technical institutions, particularly on how the use of AI influences students' communication, teamwork, and critical thinking during actual academic tasks. While global research offers strong theoretical and experimental support, qualitative, contextualized data from Moroccan higher education systems are scarce. Moreover, current research often assumes that soft skills develop organically through exposure, rather than examining the specific pedagogical conditions required for their emergence. This gap underscores the need for classroom-based investigations such as this study, which aims to fill this gap by exploring how structured classroom interventions at ESTO highlight patterns of soft skills development and AI dependence in practice.

2.4 Conceptual Clarification: Hard Skills vs. Soft Skills

Before analyzing the results, it is important to clarify the conceptual distinction underpinning the study. Hard skills refer to technical competencies acquired through formal education or professional training—such as coding, programming, budgeting, network security, or foreign language proficiency. These skills are measurable, task-specific, and often certified.

Soft skills, by contrast, encompass personal traits and behavioral capacities that shape how individuals interact, collaborate, and solve problems. Communication, teamwork, empathy, integrity, critical thinking, and problem-solving fall within this category. While harder to quantify, these attributes significantly influence both independent performance and group dynamics.

The present methodology is built upon this distinction, seeking not to diminish technical expertise but to explore how its effectiveness is mediated by the presence—or absence—of the soft skills that sustain meaningful professional and social engagement.

2.5 AI-Mediated Learning and IMT Literacy

AI-mediated learning environments are transforming how students access, understand, and create knowledge. In the IMT (Information, Media, Technology) framework, technological literacy now encompasses the skill to critically analyze AI-generated content. However, recent research indicates that students frequently lack the metacognitive awareness needed to differentiate between help and substitution. Consequently, without proper pedagogical regulation, AI tools might inadvertently limit opportunities for independent reasoning.

3 Methodology

3.1 Research Design

This study adopts a qualitative, exploratory case study design, as articulated by Yin (2018), to investigate a contemporary educational phenomenon in its real-life context. More specifically, the research is grounded in reflective classroom practice conducted during the 2024–2025 academic year at ESTO. Rather than isolating variables under experimental conditions, the aim is to observe how soft skills emerge, develop, or falter within authentic pedagogical interventions embedded in technical education programs.

The design is exploratory because it does not attempt to test a predetermined hypothesis; instead, it examines how students respond when instructional tasks are intentionally structured to foreground communication, teamwork, and critical thinking. The classroom thus functions as both a pedagogical space and a site of inquiry, allowing for close observation of student engagement in naturally occurring academic situations. As the instructor responsible for designing and facilitating these classroom activities, the researcher occupied a dual role as both teacher and observer. This positionality provided direct access to classroom dynamics but also required careful attention to reflexive observation. To mitigate potential bias, observations were systematically recorded using predefined evaluation criteria, and interpretations were grounded in multiple sources of evidence, including oral performances, written submissions, and classroom interactions.

3.2 Participants

The study involved three cohorts enrolled in technical degree programs at ESTO: two second-year classes: Civil Engineering (GCEE); Business Intelligence and Artificial Intelligence (IDAA), and one third-year class, Computer Science and Business Management

(IGE). In total, 191 students participated in the interventions. The distribution of participants across cohorts is presented in Figure 1.

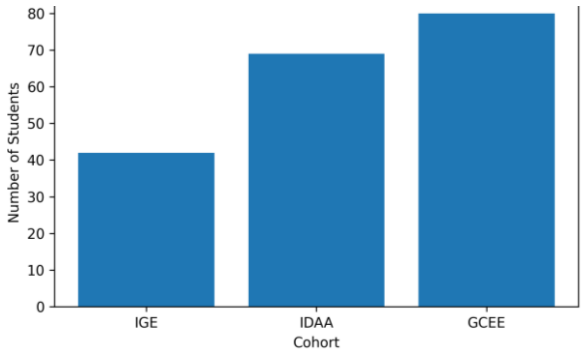

Figure 1: Distribution of participants by cohort

All participants had studied English for a minimum of six years before entering higher education and were following professionally oriented curricula with a strong emphasis on technical competencies. These cohorts were deliberately selected because they represent disciplines in which hard skills traditionally dominate curricular priorities. This context provided an appropriate setting to explore how soft skills are enacted—or neglected—within technical education environments.

3.3 Data Collection

Data were collected through two structured classroom-based activities designed to foreground specific soft skills. The first intervention targeted communication and teamwork. Students in GCEE and IDAA were assigned the same task in separate classes. Each group was required to prepare and deliver a presentation on a core disciplinary topic. The assignment demanded collaborative planning, division of responsibilities, organization of content, and coherent oral delivery. Beyond content mastery, the task implicitly assessed how students negotiated roles, managed time, and communicated ideas collectively.

The second intervention focused on critical thinking. Third-year students in IGE were asked to respond to open-ended, analytical questions related to their course material. Responses were delivered either orally during classroom discussion or submitted in written form through a digital platform. This format allowed for comparison between spontaneous in-class reasoning and more structured written responses. The objective was to examine students' ability to analyze, evaluate, and synthesize information rather than merely reproduce memorized content.

Across both interventions, data were collected through structured classroom observations guided by predefined criteria, qualitative evaluations of written submissions and oral performances, and informal post-activity student feedback. This triangulation of sources strengthened the interpretive depth of the findings by combining observed behavior with tangible student outputs.

Although the study did not formally track specific AI tools, informal student feedback indicated frequent use of widely accessible generative AI platforms (e.g., text-generation assistants) during written assignments. The identification of AI-assisted patterns was therefore based on observable textual features rather than software detection tools.

3.4 Assessment Rubric

Soft skills were evaluated using a focused rubric built around three principal criteria (Figure 2):

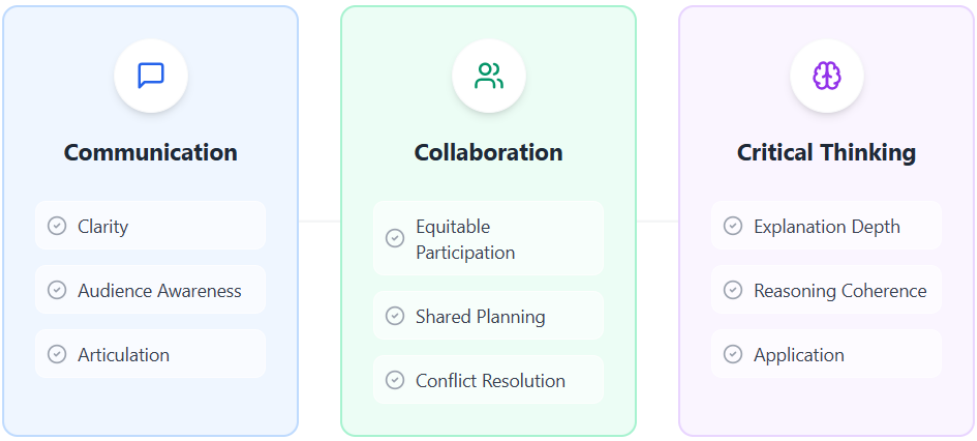

Figure 2: Soft Skills Assessment Framework

a. **Clarity and coherence of communication** – assessing logical organization, fluency, and the ability to convey ideas effectively.

b. **Equitable participation in teamwork** – examining the distribution of roles, visible contribution of members, and collaborative balance.

c. **Depth of reasoning and originality in responses** – evaluating analytical rigor, evidence of independent thought, and avoidance of purely reproductive answers.

Each criterion was rated on a four-point scale (1 = emerging; 4 = proficient). The scale was not intended to yield statistical generalizations but to provide structured qualitative differentiation across varying levels of performance. This framework enabled consistent evaluation across groups while preserving interpretive flexibility. See Table 1

Criterion	1 Emerging	2 Developing	3 Competent	4 Proficient
Communication	Fragmented ideas, unclear structure	Partial organization, uneven clarity	Generally coherent and fluent	Logically structured, audience-aware, precise articulation
Collaboration	Minimal visible contribution	Uneven participation	Shared effort with minor imbalance	Equitable roles, active coordination
Critical Thinking	Reproductive responses	Limited analysis	Clear reasoning with some originality	Rigorous analysis, independent insight

Table 1. Analytical Rubric Framework for Group Performance Assessment

3.5 Analytical Procedure

Observational notes, oral interventions, and written submissions were coded thematically to identify recurring patterns. Particular attention was given to participation dynamics within groups, the extent to which students relied on prepared text versus spontaneous explanation, structural similarities across written responses, and evidence of independent reasoning. See Table 2.

Theme	Observational Notes	Oral Interventions	Written Submissions
Uneven Participation	✓	✓	—
Memorized Phrasing	—	✓	✓
Formulaic Structure	—	—	✓
Creative Problem-Framing	✓	✓	✓

Table 2: Evidence–Theme Triangulation Matrix

Through this coding process, patterns emerged: an uneven distribution of speaking roles, formulaic presentation structures, reliance on memorized phrasing, and, in some cases, limited analytical depth. At the same time, instances of authentic engagement and creative problem framing were documented.

This analytical clarification enhances the study's credibility by making explicit how interpretations were derived from observable classroom evidence rather than impressionistic judgment. By situating the inquiry within concrete pedagogical practices, the methodology offers a contextualized lens through which to examine the persistent gap between curricular aspirations and actual student performance in communication, collaboration, and critical reasoning within technical education.

3.6 Data Aggregation and Scoring Distribution

To transition from qualitative observation to a structured analytical framework, student performances across all cohorts (*N*=191) were aggregated based on the four-point analytical rubric (see Figure 3). This process allowed for a systematic comparison between the three core competencies. The distribution of these scores, derived from the triangulation of oral presentations, written submissions, and in-class interventions, is presented in Table 3.

Criterion	Level 1 (Emerging)	Level 2 (Developing)	Level 3 (Competent)	Level 4 (Proficient)	Mean Score
Communication	35% (67)	45% (86)	15% (29)	5% (9)	1.9
Collaboration	25% (48)	50% (95)	18% (34)	7% (14)	2.07
Critical Thinking	60% (115)	25% (48)	10% (19)	5% (9)	1.6

Table 3: Distribution of Student Performance Scores across Evaluated Soft Skills (*N*=191)

The data in Table 3 reveal a significant clustering at the "Emerging" and "Developing" levels. Notably, Critical Thinking shows the highest concentration in the "Emerging" category (60%), validating the observation that students struggled to move beyond reproductive or AI-generated responses. While Collaboration scores are slightly higher, the 50% concentration in the "Developing" stage reflects the "uneven participation" noted during group tasks, where a minority of students typically assumed the bulk of the communicative responsibility.

The discrepancy between the structured nature of written assignments and the spontaneous requirements of oral defense is further explored in the following sections, using these aggregated benchmarks as a point of departure for thematic analysis.

4 Findings: Classroom-Based Soft Skills Integration

Rather than relying solely on theoretical discussions and broad claims about the soft skills gap, this section presents evidence drawn from direct classroom practice at ESTO. The objective is to examine how students mobilize three key competencies—communication, teamwork, and critical thinking—through structured classroom activities. By emphasizing practical teaching interventions, this section offers grounded insights into the ongoing challenges students face in mastering these vital skills. The analysis draws on two classroom-based case studies designed to examine how students engage with activities intended to develop communication, teamwork, and critical reasoning within a technical education context. The following analysis integrates qualitative classroom observations with the aggregated rubric scores presented in Table 3, allowing the descriptive findings to be interpreted in relation to the overall distribution of student performance.

The first case study involves two classes from different majors (79 GCEE students and 69 IDAA students), each assigned group presentations to deliver in front of their classmates. Both groups consisted of second-year students who had studied English for at least six years. Students were required to give presentations on core disciplinary topics that they had to select themselves, and they also had the option to choose their group members. This structure allowed students substantial autonomy in choosing both the topic and the composition of their team. The tasks required teams to select a disciplinary topic, distribute responsibilities, and deliver a coordinated presentation.

The classroom observations revealed considerable challenges across most teams. The aggregated data presented in Table 3 indicate that only 20% of students reached the "Competent" or "Proficient" levels in communication, while 80% remained at the "Emerging" (35%) or "Developing" (45%) stages. These results correspond closely with classroom observations: although a small number of groups demonstrated mastery of the selected topic —either in explanation or discussion—the majority struggled to coordinate their work effectively.

Participation within groups was often uneven during the presentations. In many cases, low achievers were assigned very short sections to read aloud without demonstrating understanding or the ability to discuss or explain key concepts, whereas one or two students dominated both the presentation and the subsequent discussion. This imbalance reflects the distribution observed in the collaboration rubric scores, where 75% of students were classified at the "Emerging" (25%) or "Developing" (50%) levels, suggesting that equitable participation and shared responsibility remain difficult to achieve in collaborative tasks.

The uneven participation observed reflects patterns identified in sociocultural theory, where limited interaction reduces opportunities for shared knowledge construction (Vygotsky, 1978).

Communication challenges were also evident in students' limited verbal fluency and an overreliance on prepared materials. Presentations frequently depended heavily on slide-based text, often densely packed with information, suggesting that students relied more on reading prepared scripts than on demonstrating confident command of the subject matter. In several cases, the instructor often had to request clarification or further elaboration of key disciplinary concepts.

Students also struggled to respond effectively to questions posed by their peers and instructor. These exchanges often exposed gaps in learners' preparedness and limited capacity for spontaneous explanation—an issue consistent with the communication rubric results, where only 5% of students achieved the "Proficient" level.

One possible explanation lies in the linguistic context of instruction since the language of disciplinary study (French) differs from the language of presentation (English). However,

the present study focuses primarily on soft skills rather than linguistic proficiency. The challenges observed—particularly in organizing explanations, responding to questions, and coordinating group participation—suggest broader issues related to communication confidence and collaborative practice rather than language competence alone.

These findings align with previous research indicating that communication skills do not automatically develop in technical curricula (Robles, 2012), particularly when opportunities for active engagement are limited.

The second case study focuses on third-year students (IGE cohort) who were evaluated through an activity designed to assess critical thinking. At the end of each lesson, students were assigned open-ended analytical questions related to the subject matter discussed in class. These responses were submitted through Google Classroom as homework assignments.

Many written submissions initially appeared well-structured and stylistically sophisticated. Students frequently employed formal academic language and demonstrated familiarity with key disciplinary concepts. However, the aggregated rubric scores reveal a different pattern: 60% of students were classified at the “Emerging” level in critical thinking, while 25% were at the “Developing” level. In contrast, only 15% reached the “Competent” or “Proficient” categories.

This distribution became particularly evident when the same questions were asked again during in-class discussion. When invited to explain or expand on their written answers orally, most students struggled to restate the ideas they had previously submitted online. Only a small number were able to reconstruct their arguments, provide contextual explanations, or develop original responses during classroom discussion.

Closer examination of the written submissions suggests significant difficulty in producing independent analytical reasoning. Although many responses appeared formally well-organized, a large number displayed structural similarities and stylistic patterns frequently associated in recent scholarship with AI-assisted writing. In several cases, the responses relied on generalized explanations, standardized paragraph structures, and formulaic phrasing, offering limited evidence of contextual reflection or original argumentation.

The discrepancy between polished written responses and limited oral explanations reinforces the quantitative findings. With 60% of students remaining at the lowest critical thinking level, the data indicate that many learners struggle to move beyond reproductive answers toward genuine analytical reasoning. Rather than engaging critically with course material, some students appear to rely on automated tools to generate structured responses.

Students themselves often acknowledged this reliance when asked informally about their writing process. Common explanations included time constraints, heavy academic workloads, and limited confidence in English writing skills. While these factors provide context, they also highlight the broader pedagogical challenge: students frequently resort to technological assistance when they lack opportunities to practice independent reasoning and analytical writing within their coursework.

The observed reliance on formulaic responses supports concerns raised in recent AI-related studies (Hassan et al., 2025) regarding the risk of cognitive dependency in AI-mediated learning environments.

Viewed together, the two case studies point to a similar pattern across the three competencies examined. Communication, collaboration, and critical thinking all demonstrate a strong concentration in the lower performance categories. The results suggest that despite the presence of curricular frameworks emphasizing soft skills, their practical development remains uneven within technical higher education contexts.

5 Discussion: Interpreting the Soft Skills Gap in Technical Education

The two classroom-based studies highlight a significant systemic issue within technical education: the ineffective development of soft skills, even in structured academic environments intended to foster them. These observations imply that students have limited experience with collaborative work and are not accustomed to clearly communicating technical knowledge in ways that consider their audience. Communication and teamwork, which are crucial for future professional environments, have not been systematically integrated into their previous academic experiences. As a result, students may find themselves lacking the essential tools and frameworks needed to navigate complex team dynamics and engage in meaningful dialogues with colleagues in the workplace. Students participating in both interventions demonstrate challenges in articulating their ideas, collaborating effectively, and reasoning independently. These shortcomings are neither isolated nor incidental; rather, they indicate a pervasive pattern across various disciplines and educational levels, suggesting a fundamental deficiency in how technical programs approach soft skill development.

The results also indicate a significant gap in students' ability to engage in independent reasoning. Rather than using AI as a support for developing ideas, students often rely on it to replace the thinking process altogether. This pattern suggests that the challenge is not solely technological but pedagogical: students often lack sustained opportunities to practice independent reasoning, collaborative dialogue, and audience-oriented communication within their coursework. These findings suggest that the current pedagogical approaches in education need to be reconsidered to come up with more innovative ways. It is essential to recognize that soft skills—such as communication, teamwork, and critical thinking—should not be viewed as mere complements to hard skills or allowed to develop in an ad-hoc manner. Instead, these competencies must be deliberately integrated into the curriculum, with clear alignment to course objectives. This integration involves explicitly teaching these skills and implementing rigorous assessment methods to evaluate students' progress.

Within this context, instructors become key actors in shaping learning environments where students are encouraged to take the initiative, engage in meaningful discussions, and collaborate effectively with their peers. By structuring learning environments that prioritize active participation, educators can encourage students to engage critically with both disciplinary content and their peers, thereby cultivating a well-rounded skill set that prepares them for the complexities of the modern workforce and society.

6 Conclusion

The findings of this study reinforce the widely recognized importance of soft skills in contemporary professional environments. However, most of our university curricula lean heavily on teaching hard skills and tend to give less importance to addressing soft skills in their instructions. Although the Moroccan Ministry of Higher Education has implemented reforms emphasizing soft skills in academic programs to better prepare undergraduates for employment, the implementation and acquisition of these skills still lag behind those of other universities worldwide. In a research conducted by Hind Moustadraf (2021) on engineering students from four different Moroccan universities, the participants acknowledged the crucial need for these skills for the job market; however, they also stressed the lack of practical implementation in comparison to the theoretical framework provided in the universities' curricula.

Acknowledging their growing importance, the Moroccan initiatives align with global trends, ensuring students develop a balanced mix of soft and technical competencies. As part of broader educational modernization efforts, the government seeks to enhance graduates' job prospects in an evolving workforce. By adopting the Strategic Vision 2015-2030, the ministry tends to rethink and rebuild the Moroccan educational system by launching the national plan

for Accelerating the Transformation of the Higher Education, Scientific Research, and Innovation Ecosystem 2030, or summarized as Pact ESRI, mainly by integrating soft skills into the academic curricula.

Students from various departments and branches are required to attend the Méthodologie de Travail Universitaire (MTU) module, commonly known in English as Power Skills. This essential module is designed to equip students with a comprehensive toolkit that prepares them for the competitive job market. It focuses on developing critical competencies such as effective communication, problem-solving, teamwork, and time management. Students should normally gain valuable insights and hands-on experience that enhance their employability and readiness to succeed in their chosen careers. Meanwhile, the two case studies provided above demonstrate the opposite. The activities implemented in the classroom have evidenced that the majority of students lack the necessary skills that they should have acquired while attending the MTU module. This shows a real and pressing problem; students struggle with essential skills that are increasingly in demand in today's workforce. To effectively tackle this challenge, higher education must embrace a profound transformation in both pedagogy and curriculum, placing the development of soft skills at the heart of technical training. By doing so, universities can equip undergraduates not merely to navigate the intricate landscape of an increasingly complex and automated world, but to rise as influential leaders who can innovate and inspire change in their fields. This holistic approach will ensure that students are not only adept in their technical expertise but also possess the interpersonal and critical thinking skills necessary to thrive in a dynamic future.

In this context, students bear a significant responsibility for shaping their own intellectual integrity. As AI tools become increasingly accessible, learners need to develop an ethical framework for their use—leveraging technology to enhance comprehension rather than substituting for the learning process. This requires fostering habits of self-reflection, originality, and responsible engagement with digital tools. Higher education institutions must not only guide students in acquiring soft skills but also instill in them a strong commitment to academic honesty and ethical awareness, thereby preparing them to contribute meaningfully and ethically in both academic and professional spheres.

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