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| RESEARCH ARTICLE

Enhancing Soft Skills in Schools of Engineering: The Application of the Experiential Learning Theory (ELCT)

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| ABSTRACT

This paper argues that the current ESP-oriented curriculum in engineering schools often neglects the development of soft skills, which leaves future engineers struggling to meet the growing demands of the modern job market. Despite increasing recognition of the importance of soft skills in the workplace, integrating these skills into ESP courses has received limited scholarly attention in the Moroccan context. Grounded in Kolb's Experiential Learning Cycle Theory (1984), this study aims to fill this gap by critically examining the dynamics of soft skills integration in Moroccan engineering schools. The case study of Rabat School of Mines (RSM) known in French as Ecole Nationale Supérieure des Mines de Rabat (ENSMR), provides insights into how soft skills can be embedded into the engineering curriculum. Through a combination of survey questionnaires, interviews, and desk research, the findings highlight that incorporating soft skills into ESP courses not only enhances the effectiveness of language learning but also better prepares students for the workplace. The research further reveals that this integration plays a crucial role in equipping students with the language skills necessary for success in their respective professions. The study concludes that soft skills such as communication, teamwork, leadership, and time management are essential for engineering students in today's globalized world. It emphasizes the need for language instructors to recognize and integrate these skills into their teaching practices, ensuring that students are not only linguistically proficient but also well-prepared for professional success.

| KEYWORDS

Soft skills; dynamics; ESP courses; Moroccan context, Experiential Learning Cycle Theory; workplace

| ARTICLE INFORMATION

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1. Introduction

In recent years, the increasing emphasis on soft skills has received a considerable amount of attention, specifically in Higher Education (HE) milieu. Studies have shown that students with strong soft skills are more likely to have better career prospects and are more likely to be successful in their chosen careers (Darwish,2019;Harvey, 2000, Yeager et al. 2022).In the Moroccan context, it is needless to argue that there has been a growing recognition of the importance of soft skills in Higher Education (HE) engineering curricula, as these skills are increasingly valued by employers in the industry (Aboubadra-Pauly, & Afriat,2019; HCP, 2019). The importance of soft skills development among engineering students, including communication, teamwork, problem-solving, leadership, and time management, reflects the need for HE engineering curricula to incorporate more opportunities for developing such skills, as they are crucial for success in the workplace (Cimatti, 2016; Gougeon,2019; HCP,2019; Katz,1974).Target skills in engineering education, such as communication, teamwork, problem-solving, critical thinking, and leadership represent the most

important soft skills for engineering students, which can lead them to better employment prospects and overall success in the workplace (Kyllonen, 2013). Indeed, engineering students need to develop a range of soft skills to succeed in the workplace, including communication, problem-solving, critical thinking, creativity, and leadership (Andersen & Hansen, 2002; DeLisi & Fox, 2016). Therefore, the importance of integrating soft skills development into engineering curricula to enhance students' employability and success is an urgent need. Drawing on the case study of Rabat School of Mines (RSM), this paper posits that while the integration of soft skills in Moroccan schools of engineering is faced with many challenges and obstacles, it is opened to potential solutions and opportunities for improvement. More specifically, this paper employs Kolb's (1984) Experiential Learning Cycle Theory (ELCT) as a theoretical framework to explore methods for teaching soft skills, identifying challenges, and demonstrating their role in producing well-rounded engineers. Thus, the concern of this study is three-fold: a) investigating the various ways by which soft skills are taught and integrated into the school of engineering curriculum; b) identifying some of the several challenges and obstacles in developing soft skills in the schools of engineering ; and c) exploring different paths and additional innovative ways to integrate soft skills in schools of engineering.

This paper reviews recent developments in the literature in the search for answers to such questions as follows: ***RQ.1*** How can soft skills be effectively taught and integrated into the school of engineering curriculum? RQ2. What are the specific challenges and obstacles in developing soft skills in the schools of engineering? ***RQ3***. How do soft skills contribute to the development of well-rounded engineers?

In order to answer the above questions, the study presupposes the following hypotheses that:***RH1***: Soft skills training (active experimentation and reflective observation) in engineering education improves leadership skills and communication skills among engineering students.***RH2***: Students who receive soft skills training have higher employability and career prospects compared to those who do not.***RH3***: Integrating soft skills in engineering curricula leads to a higher level of professionalism among engineering students.

Taken together, the paper is organized as follows. The first part engages in the discussion of the literature, theories, and concepts around the issue of soft skills within higher education, and more precisely in schools of engineering. Part two sets out to explain and justify the research methodologies and research methods adopted to answer the research questions and ultimately to achieve the objectives of the study. Finally, part three, which is practical in nature, turns to discuss the findings and suggest future research paths. There are three main sections in this part. The first section aims to show how it is essential to incorporate pedagogical practices that foster the development of soft skills (as active experimentation and reflective observation stages of Kolb's cycle) among students in engineering schools. The second section discusses how the teaching and assessment mechanics of soft skills in engineering schools can have both inclusive and exclusive effects. The third section explores how soft skills (as an iterative learning process) are not only essential for success in an engineering career but can also contribute to personal growth and future gains.

2. Review of the Literature

A considerable amount of literature has been published on the importance of soft skills development among Moroccan engineering students. Studies such as those conducted by Aboubadra & Afriat, (2019); Majid et al.(2012); HCP (2019); HCP, & Banque mondiale. (2017); and Salman (2017) suggest that there is a need for higher education (HE) engineering curricula to incorporate more opportunities for developing skills like communication, teamwork, problem-solving, leadership, and time management, as they are crucial for success in the workplace. The integration of soft skills into engineering curricula has become a focal point for educational researchers and practitioners, especially in the context of aligning student outcomes with industry demands.

In this respect, we make use of Kolb's Experiential Learning Cycle Theory (ELCT) which emphasizes a four-stage cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984) to critically examine the dynamics of soft skills integration in Moroccan engineering schools. Basically, by highlighting the four stages form basis for effective learning processes that connect theory with practice, the aim here is to showcase that the importance of learning environments not only helps promote students' engagement and active participation, but also pushes them to foster skills like teamwork, leadership, and communication (Kolb & Kolb,2005). The utility of this cycle in engineering education proves how professional it is since it shows that experiential learning enhances both critical thinking and interpersonal skills (Fowler, 2008).

Moving on, studies have shown that there are various aspects and attributes of soft skills that are often associated with emotional intelligence and include communication, leadership, problem-solving, teamwork, and adaptability and the list could go on (see e.g. Goleman et al., 2013; Moon, 2013;World Economic Forum, 2018). This renders the issue of defining soft skills one of the daunting tasks, mainly when scholars attempt to refer to them as the ability to work in teams, the ability to communicate effectively, solve problems, think critically, and/or adapt to change (Allen, 2001; Dewey,2011; Morgenstern, 2004; Komives et al., 2013). In their inquiry, Goleman et al (2013) argue that skills serve as a set of competencies that includes self-awareness, self-regulation, motivation, empathy, and social skills; and may include qualities and abilities that enable an individual to interact effectively with others and to succeed in the workplace and in life. This makes the assertion that soft skills are critical (Katz, 1974)

for making effective decisions (effective leadership) in complex and uncertain environments (Boyatzis,1982; Klein's ,2008). Therefore, promoting career growth and cultivating mindfulness within organizations (Lawler & Mohrman,1985) can be an effective way to develop soft skills such as stress management and self-awareness (Carlson & Bailey,1985).

But to reiterate again, in the field of engineering, soft skills have become increasingly important, especially in a globalized and rapidly changing economy, where engineers need to possess not only technical skills but also communication, leadership, problem-solving, and teamwork skills to succeed in their careers (Carnegie 1936). Soft skills such as adaptability, flexibility, and resilience can help individuals (engineers) cope with stress and unexpected challenges in both academic and workplace environments (Dweck ,2006 ; Ebrahimi & Erfanian, 2018; Jafri & Xu, 2021). Furthermore, with the growing emphasis on innovation and entrepreneurship, engineers need to be equipped with skills that enable them to think creatively and outside the box (Goleman, 1995).

In Morocco specifically, soft skills are becoming more crucial as the country seeks to increase its competitiveness and attract foreign investment. Employers are increasingly looking for graduates who possess a combination of technical and soft skills (Aoufir&Fadil,2021; Chaibate et al., 2020). Soft skills can help engineering graduates differentiate themselves from their peers and increase their employability (Lhalloubi et al., 2021). Additionally, soft skills can contribute to the overall development of Morocco's economy by fostering innovation and entrepreneurship (Mansouri, 2021).

We believe the best ways of including soft skills in learning can improve academic performance, better interpersonal relationships and job performance (see e.g. Adcock and colleagues, 2015; Allen & Eby. 2016; Darwish, 2019; Greenaway & Haynes, 2017). This occurrence seems to support Hairuzila (2009) thesis that soft skills training in educational and training programs can help individuals develop, making them more attractive to potential employers. And more than that, soft skills such as empathy and social skills not only can help individuals build better relationships with others, including peers, colleagues, and superiors, but also can help improve communication and collaboration, as well as better teamwork and productivity (DeLisi & Fox ,2016; Gougeon,2019, and Kossi & Makkonen,2020).

The novelty and significance of the study, therefore, consist not only in showcasing the importance of integrating soft skills in schools of engineering, but also in the fact it casts light on gaps in the field. The paper basically demonstrates how concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984) can help address the gap between technical education and workplace demands, enhancing, therefore students' competencies in communication, teamwork, and problem-solving.

Considering all the above, it can be concluded that this theoretical part has attempted to shed light on the importance of soft skills in schools of engineering by arguing that soft skills are personal attributes that enable individuals to interact effectively with others and carry out their duties in a professional manner. In general, we have argued that the impact of soft skills training on learning and employability, including its effect on job search, job retention, and career advancement is so profound and that in schools of engineering in particular, soft skills are essential for students to develop as they prepare for careers in the field of engineering (see e.g. Avolio & Yammarino, 2013;Northouse,2019; Yukl, 2010).We have also seen that one of the primary reasons why soft skills are important in schools of engineering is that they enable students to work effectively in teams, fostering teamwork, developing leadership skills, and preparing students for successful careers both within and outside the university milieu. The section that follows explains the methodology and methodological tools adopted in the current study.

3. Research Methodology

3.1 *Research design*

The present study adopts a convergent mixed methods design in which qualitative and quantitative data are collected in parallel, analyzed separately, and then merged (Creswell, J. W & Creswell, J. D, 2018). Correspondingly, as researchers and experts in social sciences point out, mixed methods offer a better understanding of the studied phenomenon and help overcome the weaknesses of either approach (be it quantitative or qualitative) with the strengths of the other.. More to the point, the framework is couched within an instrumental case study in which the selected case is representative and provides a deeper understanding of the studied phenomena (Stake, 1994; Yin, 2014).The very case study of this study, RSM (Rabat School of Mines), provides an excellent example of how integrating soft skills into ESP courses can enhance the effectiveness of language learning.

3.2 Data Collection Techniques

This paper makes use of two research instrument techniques: *survey questionnaires and interviews*. Yin (2018) indeed highlights the strength of using multiple sources to collect primary data, including interviews and survey questionnaires. The latter can yield three types of data about the respondent: factual, behavioral, and attitudinal (Dornyei & Taguchi ,2010). In this sense, questionnaires are a useful tool to provide a 'numeric description of trends, attitudes, or opinions of a population' (Creswell, 2009, p.145). The survey questionnaire contain, among other questions, a five-point Likert scale of frequency (always, often, sometimes, rarely and never) and agreement (1- Strongly disagree, 2- Disagree, 3- Uncertain, 4- Agree, 5- Strongly agree. As for the scale

of agreement, the choice of "uncertain" means in this work that the respondents abstained from giving their opinion (undecided). It is worth mentioning this point for the sake of data analysis and interpretation.

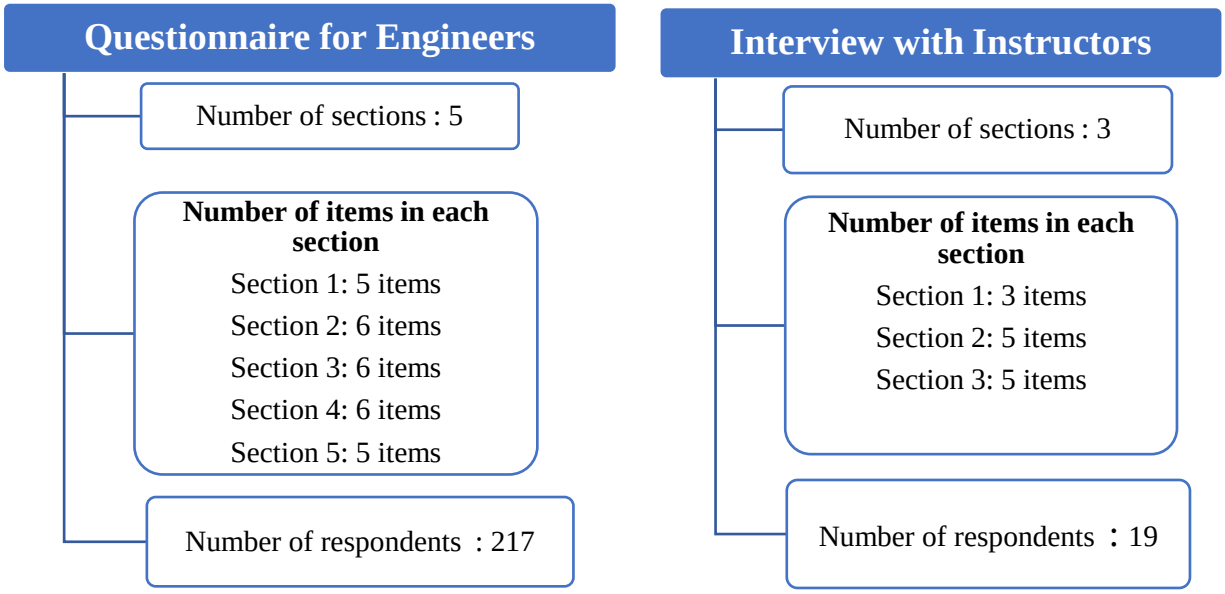

Figure 1. Screening Questionnaire& Interview Detailed Information for Both Engineers &Instructors
Source : Fieldwork Results

Additionally, the present study incorporates *interviews,* mainly semi-structured ones in order to gain more information and interactions from the part of the interviewee, and to endow the participants with a degree of power over the course of the interview (Nunan, 1992). In this respect, interview data can both illustrate and illuminate questionnaire results. As Gillham (2008) argues, to "bring your research study to life" , the researcher can make use of interviews to accompany the questionnaire results in order to gain a better understanding of what the numerical responses actually mean. As it can be noted, ***Figure1*** above gives additional information about the number of sections and items in each of the survey questionnaire and the interview.

2.5. Population Sample

The sample for this study is drawn from RSM (Rabat School of Mines) (known in French as Ecole Nationale Supérieure des Mines de Rabat), Morocco. The sample includes engineers and instructors from the same school. A purposive sampling technique is used to ensure that participants are representative of different ranks, ages, genders, and backgrounds (Onwuegbuzie & Leech, 2007).In this regard, Marshall (1996) elucidates the importance of a sample that is representative of the population, a view supported by Thompson (1992) who states that "Sampling consists of selecting some part of a population to observe so that one may estimate something about the whole population". The following section provides key information about the participants (student engineers and instructors).

2.5.1 Student Engineers

In the present questionnaire, the engineers and the instructors of Rabat School of Mines are the target population. We chose a sample population which is representative of the group we wanted to study. The table below gives detailed information about the respondents.

Stream	Level	Males	Females	Total
Common Core	**1st year**	**43**	**24**	**67**
Renewable Energies	**2nd Year**	**67**	**13**	**80**
Advanced Computing	**3rd Year**	**44**	**26**	**70**

Table 1. Screening Key Information of the Respondents (Engineers)
Source: Fieldwork Results

2. 5. 2. Instructors

Equally important, instructors and trainers are also the subjects of this study. They are responsible for the education and training of these students; so, they are considered of utmost importance in this investigation. They are asked about how they instill such skills in students and if such assets are present in the program they teach. There is also an investigation into the difficulties or hindrances they find when teaching or applying these skills in the academy. The following table presents key information about the Interview participants (Instructors).

Stream	Level	Males	Females	Total
English	**1st year**	**5**	**1**	**6**
Materials	**2nd Year**	**5**	**2**	**7**
French	**3rd Year**	**4**	**2**	**6**

Table 2. Screening Key Information of the Respondents (Instructors)
Source: Fieldwork Results

2.6. Data Analysis Procedure

The quantitative data will be analyzed using descriptive statistics such as means, standard deviations, and percentages to describe the perception of soft skills in school of engineering. The qualitative data are analyzed thematically to identify key themes and patterns that emerge from the interview data. The results from the quantitative and qualitative data will be integrated to provide a comprehensive understanding of the dynamics and mechanics of soft skills in schools of engineering (Ebrahimi, S. M., & Erfanian, M. 2018; Gougeon, 2019;Hairuzila, 2009). The integration is done through a triangulation process, where the findings from both data sources are compared and contrasted to identify areas of convergence and divergence.

2.7 Ethical Considerations

The study adheres to ethical guidelines for research, including informed consent, confidentiality, and voluntary participation. All participants are informed about the purpose of the study, their rights as participants, and the confidentiality of their responses.

2. 8 Limitations

The study may be limited by factors such as the limited sample size and the generalizability of the findings to other engineering institutions. However, the study aims to mitigate these limitations through careful sampling and data collection techniques, and through a detailed discussion of the study's limitations in the research report. The proposed research design for investigating the dynamics and mechanics of soft skills in engineering institutions, with a case study of Rabat school of Mines, provides a comprehensive understanding of the perception of soft skills among student engineers and instructors in the school. The study also identifies the challenges and best practices in developing soft skills and provides insights on how to integrate soft skills effectively.

4. Results and Discussion

4.1 Pedagogical Practices of Soft Skills

Most engineering schools in Morocco use traditional teaching methods such as lectures and theoretical assignments, which do not provide sufficient opportunities for students to develop soft skills such as communication, teamwork, and leadership (Ait Moussa et al., 2020). Moreover, engineering faculty in Morocco tends to focus more on technical skills rather than soft skills, which may further limit the opportunities for the development of soft skills in the curriculum (Ben Said et al., 2020).This does not give much room for placing a greater emphasis on soft skills development (Naamati Schneider et al., 2020). Relatedly, there is in addition much practical reasoning that due to concerns about their lack of experience or knowledge in engineering, some ESP teachers may feel intimidated by the prospect of teaching Engineering English (in contrast to General English), which could make them feel inadequate. However, the teacher's role in this situation is not to instruct learners in engineering concepts, but to help them develop their language skills within an engineering context. Importantly, fostering skills such as concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984) positively impacts and enhances soft skills development.

From this perspective, the key difference between Engineering English lies in the contextual choices for reading materials and the specialized lexis used in grammar and vocabulary exercises. Considering the growing demand for science-oriented engineers, fueled by rapidly advancing technology, future engineering students must comprehend English well enough to access knowledge

from textbooks, periodicals, and journals to stay updated with the latest developments. Viewed in this light, engineers have to be aware that English is crucial as the international language of conferences, symposia, and seminars. They need to understand specialized spoken language and actively participate in such forums, which requires strong communication skills for interacting with colleagues, participants, and other professionals.

Based on the above, it is rather difficult to decide what English to teach to students engineers in Morocco. The most important complication for teaching Engineering English courses is that students are mostly in full- time education, and also no one has any idea which kind of job those people might end up in. As ***Figure 2*** shows, there are various majors, meaning different types of ESP courses with wildly different fields of work and very specialist vocabulary. This can include Mineral Engineering, Mechanic Engineering, Electric Engineering, Computer Engineering, Agronomy Engineering and the list might go on. All of these are formally demonstrable, specialized and ESP content oriented skills (Hard Skills), born out of technical and often academic learning. By taking a close look at the nature of courses being taught at RSM, it can be deduced that the majority if not all courses are ESP content oriented. This does not leave much room for integrating soft skills into the syllabus. In this respect, Kolb's Experiential Learning Cycle Theory (1984) provides a valuable framework to address this gap as it can help bridge the divide between the rigid, content-heavy nature of ESP courses and the dynamic interpersonal, communicative, and critical thinking abilities that soft skills encompass.

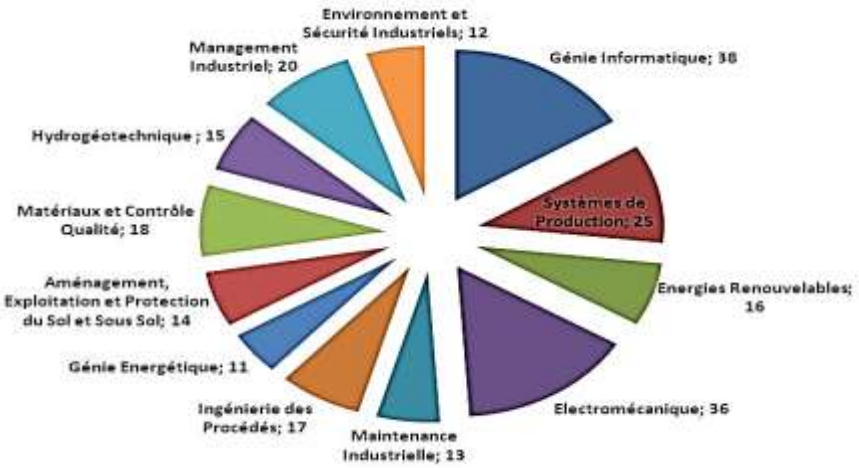

Figure 2. ESP Streams at RSM
Source : Fieldwork Results

On a different level, the proportion of Moroccan engineers who go to study or practice in English-speaking countries is relatively small compared to those who prefer to study or work in Francophone countries. Consequently, English department instructors mainly focus on equipping student engineers with the necessary skills for their careers, particularly in Engineering English. This includes, alongside Business English, targeted preparation for the TOEIC test (see ***Figure 3***).

First-year	Second-year	Third-year
S1/ General English Grammar I Reading **2hours per a week**	**S3+ S4**/ESP Business English Grammar II (Deepening Ss knowledge) **2hours per a week**	**S5**/Preparation for the TOEIC **2hours per a week**
S2/Speaking Presentations/Public Speaking **2hours per a week**	Listening Writing	**S6**/Intership

Figure3. ENSMR English Curriculum
Source: Fieldwork Results

Moving on, integrating soft skills into an ESP oriented syllabus, as argued before, is faced with challenges, most of which are allocated to student loaded timetable as shown in ***Figure 4***. More specifically, this includes time constraints as students in such ESP programs often have demanding schedules due to their specialized courses, which leaves limited time for additional modules or activities, including soft skills training. It is noteworthy to mention that ESP syllabi are typically designed to meet specific professional or academic needs. Therefore, introducing soft skills may require adjustments to the curriculum, which can be difficult to implement within the constraints of an established program. Students and educators might view soft skills as secondary to technical or domain-specific knowledge, potentially leading to less emphasis on their development. More to the point, incorporating soft skills effectively often requires additional resources, such as trained instructors, specialized materials, or dedicated time for practice, which may not be readily available.

École Nationale Supérieure des Mines de Rabat — Année 2021-2022

EMPLOI DU TEMPS - 1ère ANNEE

Semaine S08 : du Lundi 29 Novembre au Samedi 04 Décembre 2021

Jours		*Séance 1 : 8H30 à 10h15*	*Séance 2 : 10h30 à 12h15*	*Séance 3 : 14h30 à 16h15*	*Séance 4 : 16h30 à 18h15*
Lundi	A1&A2	Mathématiques Appliquées Pr NAJIB / Salle des conférences Gr.A1 & Gr.A2 en présentiel	Algorithmique/Langage C Pr ZRIRA / Salle des conférences Gr.A1 & Gr.A2 en présentiel	Anglais Pr SOUDI	Techniques d'expression
	B1&B2	Algorithmique/Langage C Pr ZRIRA /(AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Mathématiques Appliquées Pr NAJIB /(AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Techniques d'expression	Anglais Pr SOUDI
Mardi	A1&A2	Automatique Pr OUADGHIRI /Salle des conférences Gr.A1 & Gr.A2 en présentiel	Électrotechnique Pr NGOTE /Salle des conférences Gr.A1 & Gr.A2 en présentiel	Technologie & Dessin Pr LASRI / Salle des conférences Gr.A1 & Gr.A2 en présentiel	Économie de l'Entreprise Pr EL OUADI /Salle des conférences Gr.A1 & Gr.A2 en présentiel
	B1&B2	Électrotechnique Pr NGOTE /(AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Automatique Pr OUADGHIRI /(AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Économie de l'Entreprise Pr EL OUADI / (AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Technologie & Dessin Pr LASRI /AMPHI 2A Gr.B1 & Gr.B2 en ligne
	Filière GCM	Géologie de l'ingénieur 1 Pr. ACHALHI	Géologie de l'ingénieur 1 Pr. ACHALHI		
Mercredi	A1&A2	Analyse Numérique Pr ZAOUI / Salle des conférences Gr.A1 & Gr.A2 en présentiel	MDF Pr RACHEK/ Salle des conférences Gr.A1 & Gr.A2 en présentiel		
	B1&B2	MDF Pr RACHEK / (AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Analyse Numérique Pr ZAOUI /(AMPHI 2A) Gr.B1 & Gr.B2 en ligne		
Jeudi	A1&A2	Économie de l'Entreprise Pr EL OUADI / Salle des conférences Gr.A1 & Gr.A2 en présentiel	MDF Pr RACHEK/ Salle des conférences Gr.A1 & Gr.A2 en présentiel	Technologie & Dessin Pr LASRI /Salle des conférences Gr.A1 & Gr.A2 en présentiel	Management Pr SADEQ /Salle des conférences Gr.A1 & Gr.A2 en présentiel
	B1&B2	MDF Pr RACHEK / (AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Économie de l'Entreprise Pr EL OUADI (AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Management Pr SADEQ/ (AMPHI 2A) Gr.B1 & Gr.B2 en ligne	Technologie & Dessin Pr LASRI (AMPHI 2A) Gr.B1 & Gr.B2 en ligne
Vendredi	A1&A2	Analyse Numérique Pr ZAOUI /Salle des conférences Gr.A1 & Gr.A2 en présentiel	Algorithmique/Langage C Pr ZRIRA /Salle des conférences Gr.A1 & Gr.A2 en présentiel	MMC Pr GHASSANE Salle des conférences Gr.A1 & Gr.A2 en présentiel	RATTRAPAGES
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Figure 4. A Sample ENSMR Loaded Timetable
Source: https://cvtheque.enim.ac.ma/emploisdutemps/#

According to Fallows &Steven (2000), it is no longer adequate for new graduates to simply acquire knowledge of an academic subject. They suggested that broader skills including retrieval and handling of information, communication and presentation, planning and problem-solving and social development and interaction, were also critical for graduate employment in the 21st century. In other words, for the 21st century graduates, the teaching and learning at university level now should be more students-centered where students build their soft skills through various activities in the classroom. Graduates need to be prepared with a range of soft skills that underpin success in communication skills, initiative, autonomy, decision-making, team working and project management skills.

In this regard, Kolb's Experiential Learning Cycle Theory (ELCT) can be applied to integrate soft skills into Engineering English courses by aligning its stages with practical tasks. Students engineers begin with *concrete experiences* (section three in this empirical part explores this stage in more detail), such as drafting technical manuals or delivering presentations in their field. They then engage in *reflective observation*, evaluating their performance and receiving peer feedback. This is followed by *abstract conceptualization,* where students learn strategies for effective communication and problem-solving tailored to engineering contexts. Finally, through *active experimentation*, students apply these skills in simulations like mock conferences or interdisciplinary projects. This approach balances technical proficiency with essential soft skills, preparing students for diverse professional challenges.

Arguably, the interviews carried out further support the findings, as many professors interviewed claimed that integrating soft skills into the syllabus will equip learners with the necessary skills to enter the job market.In an interview with an instructor from RSM, the respondent maintained that:

> The majority of the professors in our school are aware of the importance of integrating soft skills in their teaching practices. Certainly, the challenges of communication and behavioral skills faced by our students, especially during their internships show how urgent we should act as practitioners to work toward this end by providing more courses on effective skills of interviews, group discussions, meeting management, and presentations. (Interview with RSM instructor, February, 2023)

As highlighted by our respondent above, these real-world challenges- a reflection of ***Concrete Experience*** **-** that students face during internships are instances that professors at RSM examine through ***Reflective Observation*** **in order** to help and enhance students' preparedness for professional environments. This reflection leads to the ***Abstract Conceptualization*** phase, where instructors develop a theoretical understanding of the importance of soft skills and conceptualize pedagogical strategies to integrate them into the curriculum. Courses on effective communication, interview techniques, and presentation skills become the result of this phase. Finally, in the ***Active Experimentation*** stage, these courses are implemented, providing students with structured opportunities to practice, reflect, and refine their skills. This iterative process ensures that students do not merely acquire theoretical knowledge but actively develop practical competencies, aligning education with the dynamic demands of professional engineering contexts. By following this cycle, instructors at RSM not only address immediate skill gaps but also foster a culture of experiential, lifelong learning.

There is arguably more to the notion that integrating soft skills in Moroccan schools of engineering is crucial for the success of graduates and the overall development of the country. As it can be deduced from ***Figure 5*** below, the majority of the respondents hold this view. This rejects the H_0 (Null Hypothesis) and confirms *RH2* which argues that students who receive soft skills training have higher employability and career prospects compared to those who do not. From a current perspective, these pedagogical practices help students learn strategies for effective communication and problem-solving tailored to engineering contexts mirror (Kolb, 1984).

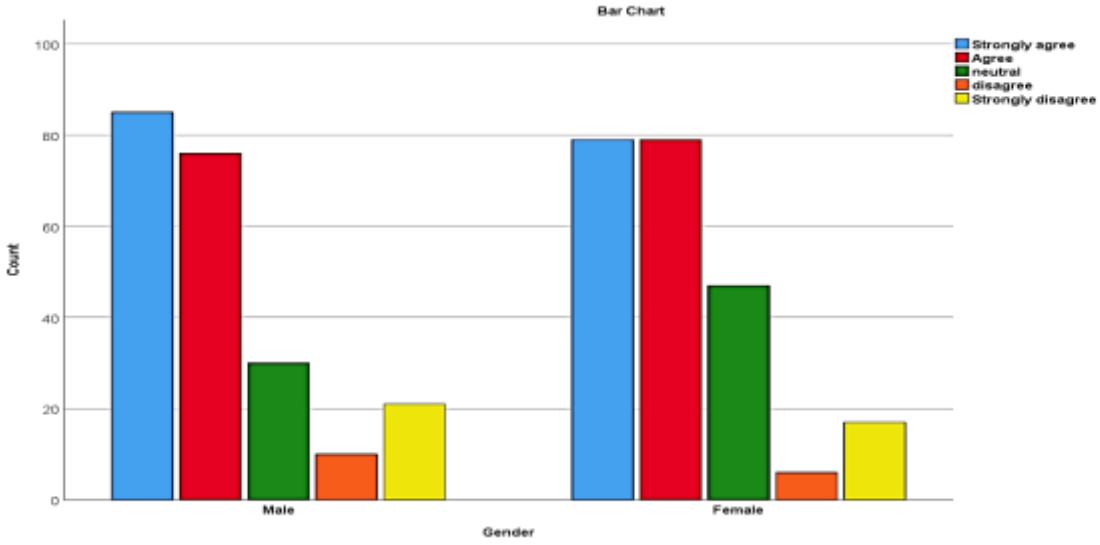

Figure 5. The integration of soft skills in Moroccan schools of engineering is crucial for the success of graduates and the overall development of the country.
Source: Fieldwork Results

Interestingly, the empirical data show that there is a general consensus among the respondents that shows and reflects a great deal of awareness among the respondents that could help decode the politics of integrating soft skills in higher education. This rejects the H_0 (Null Hypothesis) and confirms the *RH3* which stipulated that integrating soft skills in the engineering curriculum leads to a higher level of professionalism among engineering students. Furthermore, the integration of soft skills into the

curriculum through cross-disciplinary courses (*active experimentation*) can provide students with a broader perspective and enhance their interpersonal and intercultural communication skills (El Kadi et al., 2019).

Taken together, most of the current pedagogical practices of soft skills in Moroccan schools of engineering tend to focus on traditional teaching methods that do not provide sufficient opportunities for students to actively engage, reflect, and apply their knowledge in practical and interdisciplinary contexts. While fostering the development of soft skills in Moroccan schools of engineering is done through some innovative pedagogical practices such as project-based learning, experiential learning, collaborative learning, and cross-disciplinary courses -reflecting therefore, the essence of Kolb's Experiential Learning Cycle Theory, they either remain underutilized or faced by certain challenges. The following section further explores these challenges and the implications for soft skills integration in engineering education.

4.2 Soft Skills: Between Inclusion and Exclusion

In recent years, there has been a growing emphasis on the importance of soft skills in engineering education worldwide. However, in Morocco, the integration of soft skills in engineering education has been a topic of debate due to various challenges and obstacles. This practical part aims to examine the challenges and opportunities for integrating soft skills in Moroccan schools of engineering and discuss the implications of this integration for engineering education.

In fact, one of the main challenges of integrating soft skills in Moroccan schools of engineering is the lack of recognition of their importance by engineering faculty and students. According to Ben Said et al. (2020), engineering faculty in Moroccan universities tend to focus more on technical skills rather than soft skills, which may result in the exclusion of soft skills from the engineering curriculum. This is evidenced by the empirical findings (see **Figure 6** below) which reveal that most respondents strongly agree that there is a lack of awareness about how engineering students visualize the learning/assimilation of soft skills and their direct application in the realities of the working world, especially in work context. Even though the new Moroccan educational system supports and advocates the integration of soft skills in the tertiary level, as for instance , suggested and stipulated in the text of the National Vocational Training Strategy 2021, there seems to be a sort of a schism in what this text (and other texts as well) says and the actual practices in the classroom-walls.

Following this model, The Strategic Vision 2015-2030 highlights the role of soft skills in fostering a generation of adaptable, innovative, and civic-minded graduates capable of meeting the demands of a rapidly evolving job market. Emphasizing these skills across educational levels, including engineering programs, is seen as a foundational step toward sustainable national development and enhancing Morocco's competitiveness on a global scale.

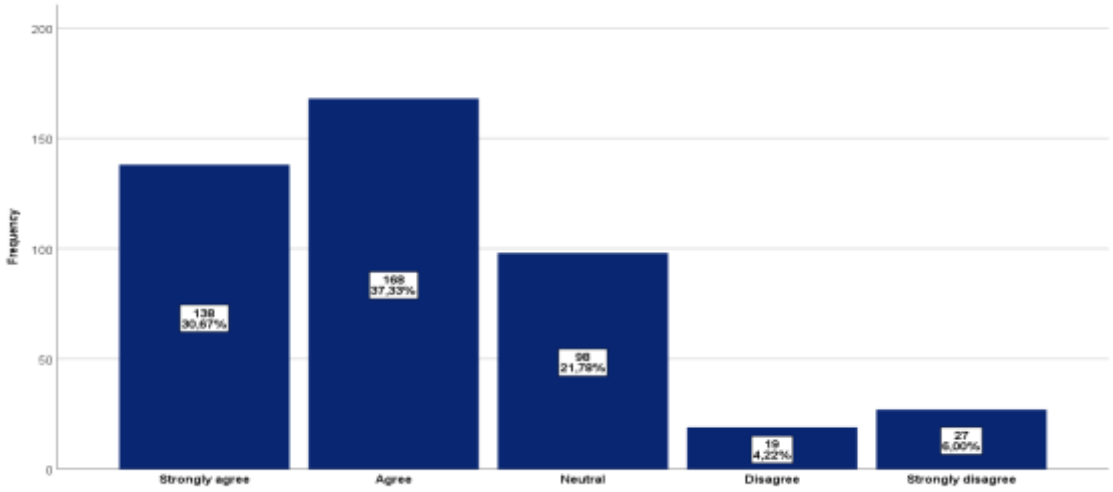

Figure 6. Screening Respondents Attitudes Towards Prioritize Technical Skills Over Soft Skills
Source : Fieldwork Results

However, as raised by *RQ2,* there are certain challenges and obstacles in developing soft skills in the schools of engineering. Indeed, engineering students in Morocco may prioritize technical skills over soft skills due to the perception that technical skills are more valued by employers (El Kadi et al., 2019). This lack of recognition and awareness of the importance of soft skills may hinder their effective integration into the engineering curriculum. This rejects the H_0 (Null Hypothesis) and disconfirms *RH3* as integrating soft skills in engineering curriculum leads to a higher level of professionalism among engineering students.

Another challenge in integrating soft skills in Moroccan schools of engineering is the lack of appropriate pedagogical methods and assessment tools. According to a study by Ait Moussa et al. (2020), most engineering faculty in Morocco use traditional

teaching methods such as lectures and theoretical assignments, which do not provide sufficient opportunities for students to develop soft skills such as communication, teamwork, and leadership. Furthermore, the lack of appropriate assessment tools for soft skills may hinder the evaluation of students' soft skills development. In this respect, these views go in hand with corresponding views of another interviewee respondent (French instructor at RSM) who affirms that:

> While traditional exams assess technical knowledge, they don't capture, on the other hand, growth in areas (soft skills) like collaboration or adaptability. Therefore, without proper assessment tools, it would be a daunting task to measure students' progress in soft skills. Actually, we need tools that allow us to observe and assess such skills in action—through task based activities, project work, presentations, workshops, or peer evaluations. However, creating and implementing these tools requires extra time, training, and often, faculty support.(Interview with RSM French instructor, June, 2023)

Another link which is important to make here, and which slips again under Kolb's Experiential Learning Cycle Theory is that there are also opportunities for integrating soft skills in Moroccan schools of engineering. Indeed, the increasing demand for engineering graduates with soft skills by Moroccan employers can provide an incentive for engineering faculty to include soft skills in the curriculum (Boudali et al., 2020).For instance, innovative methods like presentations, debates, and collaborative learning provide platforms for students to practice effective communication and teamwork. Experiential learning, when implemented in these forms, ensures that students do not merely learn about soft skills theoretically but develop them in meaningful, practical, and context-driven environments (El Kadi et al., 2019). Note additionally that project-based learning and problem-solving tasks provide students with real-world scenarios (concrete experience) that require collaboration and critical thinking. When doing so, students analyze (*Reflective observation*) their experiences, considering what worked and what didn't. All these, in turn, offer a clear framework for embedding soft skills into education.

Streams / **Soft Skills Techniques Integration**	**Engineering Streams**					
	Common Core		**Renewable Energies**		**Advanced Computing**	
Group projects	14	10%	17	17 %	16	16%
Internships or co-op programs	19	22.5%	13	13 %	17	17 %
Leadership positions in student organizations	14	10%	10	10 %	15	15%
Workshops or training sessions on soft skills	17	17.5%	15	15 %	32	32%
Public speaking opportunities	20	25%	18	18 %	12	12%
Outings/Excursions	16	15%	27	27 %	8	8 %
Total	100	100%	100	100%	100	100%

Table 5. Showcasing Soft Skills Techniques Integration in Some Moroccan Engineering Streams
Source: Fieldwork Results

By analogy, the integration of soft skills in Moroccan schools of engineering is not a question of *what (what soft skills to teach),* but rather *how (how to teach them).* In this respect, and in finding answers to *RQ1*, we asked the respondents about certain techniques through which soft skills can be taught/introduced. **Table 5** above illustrates some of the soft skills integration techniques across three engineering streams in RSM : Common Core, Renewable Energies, and Advanced Computing. The findings reveal that Public speaking opportunities oriented activities are prioritized across all streams, especially in Common Core (25%) and Renewable Energies (18%), highlighting therefore, the importance of communication skills alongside technical expertise. Moving on, Workshops on soft skills are particularly prominent in Advanced Computing (32%), compared to 17.5% in the Common Core and 15% in Renewable Energies. This suggests that such high emphasis in Advanced Computing reflects the growing recognition that technical fields benefit greatly from interpersonal and communication skills, critical for team projects and client interactions. Additionally, Internships or co-op programs on their part are given more attention in the Common Core (22.5%), followed by Advanced Computing (17%) and Renewable Energies (13%). The Common Core's higher percentage may indicate the importance given on early professional exposure to ensure students engineer gain practical, industry-relevant experience before specializing.

These findings reveal that catering for soft skills integration is mostly tied to the approach(s)/ technique(s) being adopted across engineering streams. As argued before, each stream prioritizes specific soft skills based on the demands of its respective field: for example, Advanced Computing emphasizes workshops on soft skills and leadership, while Renewable Energies focuses more on outings and group projects. This distribution highlights an understanding that well-rounded development requires tailoring soft skills activities to fit the specific needs of each engineering field.

Thus construed, the integration of soft skills in Moroccan schools of engineering presents both challenges and opportunities. Engineering faculty and students need to recognize the importance of soft skills and develop appropriate pedagogical methods and assessment tools to facilitate their integration into the curriculum. Moreover, the use of innovative teaching methods and the increasing demand for engineering graduates with soft skills by Moroccan employers can provide opportunities for the effective integration of soft skills in engineering education in Morocco.

While bearing this in mind, it is often argued that soft skills are not only essential for success in an engineering career, but can also contribute to personal growth and future gains. The section that follows highlights this point in more details.

4.3 Soft Skills Towards Personal and Professional Future Gains

Having discussed the interplay between how it is essential to incorporate pedagogical practices that foster the development of soft skills among students in engineering schools, and how the teaching and assessment mechanics of soft skills in engineering schools can have both inclusive and exclusive effects, this section will attempt to enhance our understanding of the dynamics of how soft skills are not only essential for success in an engineering career but can also contribute to personal growth and future gains. The results of this study have shown that the dynamics of soft skills have direct effects on personal growth and future gains of students engineers (Confirms *RH3*) .

Test Statistics[a]

	Please indicate how important for you are the following forms of soft skills: Problem-solving and critical thinking?	Please indicate how important for you are the following forms of soft skills: Leadership and management ?	Please indicate how important for you are the following forms of soft skills: time management and organization?	Please indicate how important for you are the following forms of soft skills: Emotional intelligence?	Please indicate how important for you are the following forms of soft skills: Adaptability and flexibility?	Please indicate how important for you are the following forms of soft skills: Creativity and innovation?
Mann-Whitney U	1639,500	1775,000	1722,000	1757,000	1721,500	1655,500
Wilcoxon W	3917,500	4053,000	3153,000	3188,000	3999,500	3933,500
Z	-,772	-,003	-,304	-,100	-,320	-,690
Asymp. Sig. (2-tailed)	,440	,998	,761	,920	,749	,490

a. Grouping Variable: Gender

Table 6. Screening Gender-Based Perceptions of Soft Skills Importance: Mann-Whitney U Test Results
Source: Fieldwork Results

As raised by ***RQ3*** (How do soft skills contribute to the development of well-rounded engineers?), **Table 6** shows the recognition of soft skills' importance across gender lines reinforces the belief that there is a collective understanding among engineering students that these skills are instrumental for both individual and career success. And it is valid because this alignment can further motivate educational institutions to incorporate structured soft skills training in engineering curricula, supporting students' holistic development and preparing them to meet the demands of modern engineering careers.

In particular, the results of a Mann-Whitney U test underscore the perceived importance of different soft skills among respondents, segmented by gender. The analysis includes six specific soft skills: *problem-solving and critical thinking, leadership and management, time management and organization, emotional intelligence, adaptability and flexibility,* and *creativity and innovation*. For each skill, the Asymptotic Significance values are above the standard threshold of 0.05, indicating that there are no statistically significant differences in how men and women perceive the importance of these soft skills. This suggests that gender does not significantly impact how respondents rate the importance of these soft skills. The Mann-Whitney U values vary across skills, with *problem-solving and critical thinking* showing a U value of 1639.5, while *leadership and management* is at 1775.000.

Although there is variation, these U values support the non-significant findings indicated by the Asymptotic Significance values. On the whole, the results suggest that gender does not significantly affect the perceived importance of soft skills among respondents. Both male and female participants rate these skills with similar importance, as shown by non-significant p-values and low Z scores across all skill categories. This lack of gender differentiation highlights a possible consensus on the value of these soft skills, suggesting they are universally recognized as critical competencies in various professional and educational contexts.

On a related note, it should be stressed out that engineering programs in Moroccan universities are increasingly incorporating soft skills training into their curricula to prepare students for the workforce and help them advance their careers. In this line of thought, El Khaldioui & Fakir, (2021) argue that while engineering students find that communication, teamwork, and problem-solving are the most important soft skills for their future careers, they believe that their engineering programs do not provide enough opportunities to develop these skills.

In fact, the empirical findings of the current study further support the claim that engineering students in Morocco find that soft skills training has a positive impact on their professional development (Confirming *RH3*). As Jabri (2023) points out, engineering schools in Morocco should provide students with more opportunities to develop their soft skills through internships, workshops, and extracurricular activities. The latter can significantly enhance students' personal and professional development. By participating in volunteer work, such as painting classrooms in rural areas or aiding local communities (see ***Figure 7***), engineering students can put their soft skills into action. In fact, it is through *concrete experience* that students engage directly in meaningful activities, paving the way to more *reflective observation* and analysis of their experiences and the challenges faced. This sort of engagement contributes to enhancing students' soft skills and bridging the theory and practice gap. Specifically, while these activities help students appreciate diversity, work selflessly, and contribute to the well-being of others, they also help students train and prepare them to handle and deal with unforeseen challenges that require quick thinking and adaptability.

Figure 7. Fostering Soft Skills Through Concrete Experiences: Classroom Painting and Community Volunteering
Source : Fieldwork Results

Overall, this section has explored the critical role of pedagogical practices in nurturing soft skills within engineering education, recognizing that effective teaching and assessment of these skills can shape student outcomes inclusively or exclusively. By delving into how soft skills enhance both professional success and personal growth, this discussion underscores their lasting value, highlighting that engineering education should prioritize these competencies as foundational for future achievements and well-rounded development.

5. Conclusion

This study attempted to argue that most Moroccan engineering schools rely heavily on traditional teaching methods (lectures, for instance), where knowledge is acquired in a theoretical manner. From Kolb's Experiential Learning Cycle Theory (ELCT) lens, this provides limited opportunities for students to develop essential soft skills such as communication, teamwork, and leadership. The

findings of the study also revealed that the emphasis on technical skills, with less focus on soft skills development, is largely due to faculty priorities and curriculum structure (Ben Said et al., 2020; Naamati Schneider et al., 2020).

The study also tried to prove that even though there is growing recognition globally of the importance of soft skills, engineering education in Morocco faces unique challenges mainly with regard to the limited emphasis on practical, hands-on experiences and soft skills development that neglects the crucial stages of *concrete experience* (real-world tasks), *reflective observation* (experiences), and *active experimentation* (applying what has been learned to new situations).Similarly, the finding highlighted the importance of embedding pedagogical practices that foster soft skills development in engineering education, highlighting how teaching and assessment methods can inclusively or exclusively impact students.

Indeed, it was argued that soft skills are not only vital for success in engineering careers but also play a significant role in personal development and long-term achievements. In this respect, the findings confirmed that developing soft skills, such as communication, teamwork, and leadership, directly contributes to both the personal growth and future career potential of engineering students. Through a balanced approach, these skills prepare students to navigate complex professional environments and build a foundation for lifelong success.

Finally, the paper argued that encouraging student-led clubs and workshops dedicated to leadership and communication, designing assessments that evaluate both technical and soft skills with ongoing feedback, and establishing mentorship programs with industry professionals, will greatly equip engineering students with the essential soft skills needed for their future careers.

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