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Nurturing Human Skills for Excellence: A Pathway to Success for IT Engineering Students and Graduates

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Abstract

This article has a particular theoretical orientation, as it seeks to advance our understanding of issues related to human skills in Moroccan engineering schools. Besides, it presents a conceptual framework that links previous research on upskilling, learning theory and practice within the framework of technological development and changing curricula. Taking cue from relevant scientific reports and field experience, and proposing English language competence as a key performance indicator for advanced human skills, the study shows how career-aligned curricula, pedagogical innovation and transformative governance can improve students' and graduates' skill-sets and employability, and result in high-performing organizations. Finally, implications for making use of skill-mapping models and skill framework analyses are discussed in the hope that prospective data-driven learner monitoring and evaluation will improve student workplace readiness and attract the attention of potential employers.

Keywords: upskilling, skill-mapping, information technology, language competence, transferable skills, skills mismatch

1. Introduction

The future workforce landscape is ever more uncertain. With technologies playing a pervasive role in learning organizations, thus making skills-based education a pre-requisite, and affecting entire generations of learners, the need for disciplinary and transferable skills for job-ready

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careers has never been more in demand by employers. Indeed, lasting changes in workers' skills-set entails a reconsideration of the learning pathways likely to generate future talent, and drive a relentless digital transformation and a global recovery. Never has this been more true than in today's Moroccan engineering schools, where policies are being enacted to develop the right mix of skills in students so they can seamlessly integrate into the job market, as only well-rounded engineers, with outstanding cognitive, communication and leadership skills can be accommodated, nurtured and valued by their employers.

In this respect, numerous data-driven reports were drafted to highlight the state of regional and global skills, and the measures being undertaken to bring engineering student talent into line with global educational standards. It is noteworthy that research on engineering students' cognitive, psychosocial and leadership skills has not received the attention it deserves from scholars who have investigated it. Furthermore, the paucity of primary source data on the human skills dimension in curricula has resulted in predominantly suboptimal student performance, which should lay the groundwork for a more in-depth analysis of the relevant skills components needed for successful performance.

2. Research Method

The current study employed a multilayer methodological approach that combined both qualitative investigation and desk review. The analysis of documents, data sets, and maps provided a strong theoretical basis for a focus group methodology that has the advantage of creating value from an immersion into a specific subject area (Kania & Kramer, 2011). This methodology pathway also emerged as an interactive, cost-effective and time-saving endeavor, drawing on key principles from two major perspectives in higher education; namely, the theory of employability by Yorke and Knight (2004) and Multiple Intelligences (Gardner, 1983). In addition, both the broader framework of John Dewey's constructivist theory (Dewey, 1938), quoted in Saul Mcleod's article (Saul, 2023), and the associated learning and employability framework constituted an important element in the current investigation (Sumanasiri et Al. 2015). Believing that unstructured research orientation and different levels of analysis were consistent with the time-bound fieldwork and practical requirements of upskilling research, the study would leverage the transfer of reliable information based on direct input from university lecturers even as they used advanced student-oriented formative techniques across different engineering streams. At a more concrete level, eight teachers took part in six-session focus group dynamics between October and December 2022 of which I operated as a moderator,

which embodied the ambitions, expectations, but also concerns of students at multiple levels. Additional input materialized from the corporate relations department, considered as the pivotal external relations actor in terms of graduates' future placement.

3. Global Skills Reports: A Literature Review

Realizing the potential of engineering education can produce highly skilled professionals and unleash huge contributions to economic and social development. A series of industry reports that analyze the human, technical and employability skills engineering students need to develop in order to strike a responsive chord with future employers have attracted my attention ; namely, the Quacquarelli Symonds (QS)'s 2018 report on the *Global Skills Gap in the Twenty-first Century*, Udemy's 2019 « *Skills Gap Report* », the 2022 Coursera's *Global Skills Report*, the *Unbounded University* and *Education for Employability* Reports, and finally the 2022 Cornerstone's *Thriving in the Global Skills Shortage* report. These reports could be said to accurately represent the broader characteristics of the current training and skills development landscape, and should allow me to abstract the collected information to a larger audience and provide useful insights to support training and engineering education program delivery in Moroccan engineering schools.

3.1. Background

The reports under consideration were issued at a time of tremendous change, in both academia and the professional world, sparked by a global pandemic, which resulted in a re-think of how job performance and success requirements were being perceived. In Moroccan higher education, curricula underwent a total recasting in line with the various trends that were affecting the workplace, with a view to deriving a new pathway to the skills students would need moving forward. The digital onslaught further drove the need for identifying the key work skills and capabilities needed by graduates in the future, which made even the unwilling among learners embrace new digital capacity-building opportunities. In the professional world, however, the pivot to digitalization would entail a radical shift in learning, as well as in human relationships, thus making employer, and employee continuous learning and development a business imperative. In this respect, capitalizing on change and considering the challenges of a highly competitive market would mandate worker upskilling and reskilling, as the workplace is in a constant state of flux that transcends the limits of knowledge work. From this perspective, human-centric organizations with a continuous learning focus would definitely lead the way in value creation and unleash the potential of all stakeholders, who would need to develop the

right attitudes, knowledge and skills to win the hearts and minds of employees, clients and customers.

3.2. Similarities

The reviewed reports seem to suggest that both organizations and their stakeholders have realized that skills and capacity development are increasingly relevant in visualizing their shared future. Nevertheless, they also report a blatant skills shortage that undercut their growth and investment trajectories, in both talent management and long-term growth, as shown in "Figure 1" below.

Figure 1: *Some statistics on the evolution of job-related skills by 2025*

From an educational standpoint, any perceived skills gaps are believed to originate from universities' lack of aggressive student engagement strategies in critical, job-relevant human skills. Moreover, even when attempts are made to upskill would-be hires, companies and educational institutions which fail to support a constant learning culture end up being relegated to the second-tier status of laggards in terms of performance and scale, which may be conducive to the loss of comparative advantage in digital supremacy[1]. Worse still, most students are said

[1] According to an Accenture research report, when companies fail to develop their existing workforce fast enough, it can render them less innovative and agile, and prevent them from capitalizing on new business opportunities. For more information on how intelligent technologies are subverting the skills mix, download the above-mentioned report from the following link: https://www.accenture.com/_acnmedia/pdf-40/accenture-strategy-harnessing-revolution-pov.pdf.

to be ill-prepared for the constantly evolving employer demands in terms of skill-sets, which demonstrates a lack of awareness thereof. This has led to student misconception about the nature and scope of continuous learning, and the need for particular skills as a means to overcome the alleged employer mismatching expectations[2].

3.3. Differences

Indeed, the issue of mismatching expectations among students and employers is more acutely reflected in the QS report where skills gaps across regions, countries and firms of varying sizes were highlighted. In fact, skills and behavior gaps in problem solving, teamwork, and communication for students transitioning into a new career have raised not only the concern of future employers but universities as well, which mandates student urgent profile adaptation. Here, what is more particularly relevant is how students embrace skills development, and the extent to which the skills adaptation process is harnessed and continually nurtured by universities and employers working in sync, not in siloed environments. Through this reciprocity, small ideas grow into more ambitious career plans, with the potential of leapfrogging in student capability development. More importantly, progress should be made towards having universities and employers clearly communicate the types of skills needed to propel learners into twenty-first Century jobs in such a way as to avoid prospective career misalignments[3]. Resilience in particular, which is the ability to manage stress that new hires usually experience as part of the onboarding process, is given a relatively strong satisfaction to importance ratio[4]. From another perspective, bridging the skills gaps would entail raising student awareness as to the importance of professional networks and internship opportunities, and to on-the-job training design and content by universities, which would provide incentives for them to upskill. Also, there is a need for a better articulation of student outreach by organizations so that graduates develop high expectations about learning and the job market, as students are increasingly vested with the responsibility to ensure their own upskilling.

[2] The importance of creativity and leadership skills are overblown by some students, which results in a neglect of key human skills, such as flexibility/adaptability and teamwork. There is a need to have the most valued skills clearly communicated in order to avoid mismatched expectations among students and future employers. For more information, log onto the following Website « www.qs.com » to download the QS Global Employer Survey report which evaluates employer and student attitudes, and exposes areas of misalignment.

[3] The QS report seems to have been the only report that calls for company-university synergies in bridging students' gaps so that when students upskill, they prioritize company-relevant skills-set.

[4] The American Psychological Association (APA) confirms that resilience is not a personality trait, but rather a behavior that can be learned, both in college and during the graduate probationary, or induction period. For more information on resilience as a learned behavior, log onto the following Website: https://www.apa.org/.

On the employer-employee skills confidence gap front, it has widened through the Pandemic as far as laggard organizations are concerned while high-performing organizations were rated high on both learning and talent outcomes as shown in Figure 2.

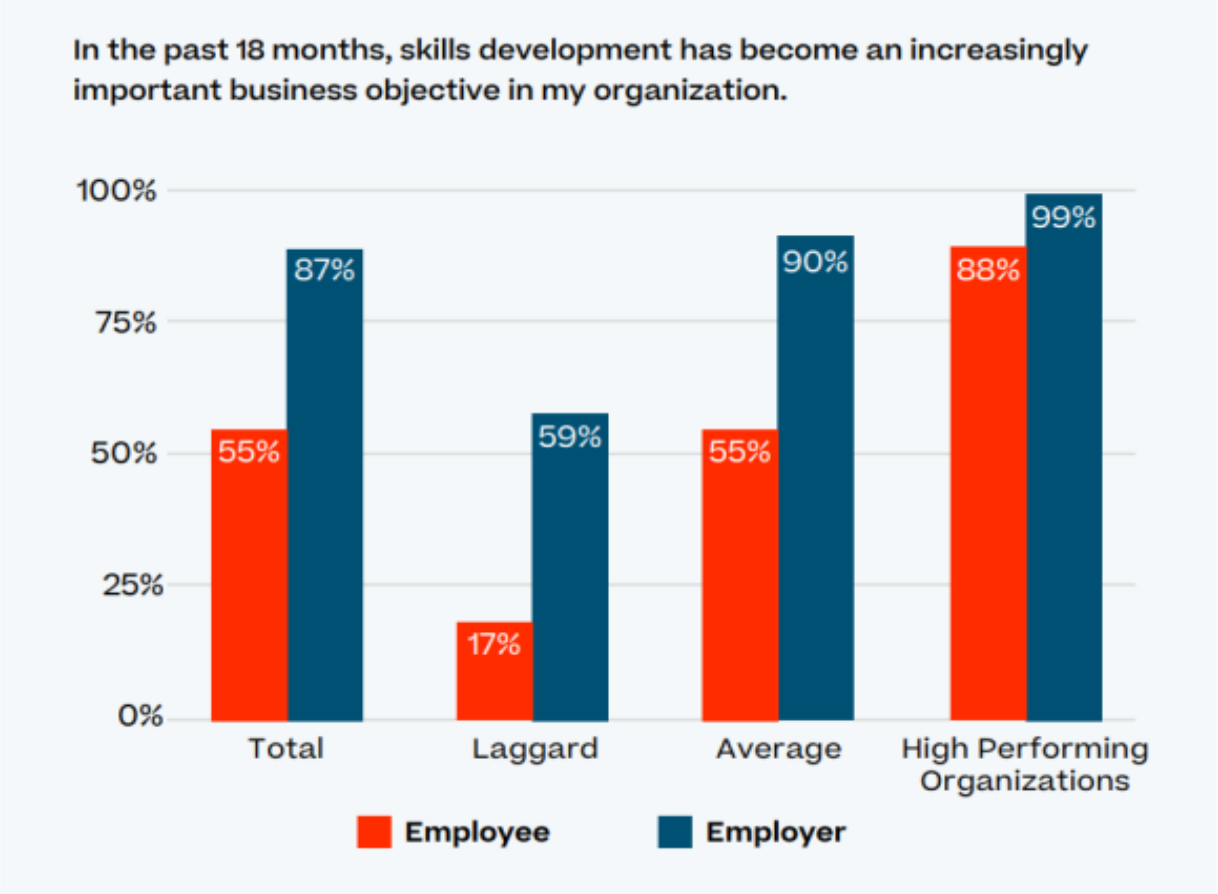

Figure 2: *Survey on the importance of skills development as a business objective*

It is noteworthy that the Cornerstone report raises employers' expectations as to the necessity of better enacting learning policies for young graduates, as employees were more vocal in their criticism of employers being out of touch with graduates' and employees' needs and expectations. On the gender front, women (68%) were reported to feel much more affected by the skills gap than men (52%) suggesting that skill building and company-based training programs for would-be graduates need to reflect higher levels of gender balance[5]. Finally, job-relevancy was found to be increasingly tied to technical skills, as students displaying advanced technical skills tend to land more entry-level job opportunities than others. In this respect, universities usually find themselves pushed to the limits of their agility, as the fast pace of

[5] For comprehensive statistics on the gender-based skills differentials, download the *2022 Udemy report* from the following Website: https://business.udemy.com.

technological development overrides their capacity to propose curricula that are cohesive, effective and fit-for purpose.

3.4. Recommendations

The reports under consideration were particularly effective at issuing the following multi-level recommendations, especially as the scope and scale of students' upskilling in the face of shifting economic and labor-related realities become ever more ambitious.

3.4.1. Access & Equity

The positive correlation between internet access and performance cannot be overemphasized. In fact, student internet access remains a determining factor in both senior students and organizations' success. However, "the internet may be the great equalizer, but internet access is not equal" [6]. As illustrated in Figure 3 below, internet access differentials entail suboptimal skills proficiency levels for students of lower socio-economic backgrounds, who usually suffer from a lack of access to learning resources.

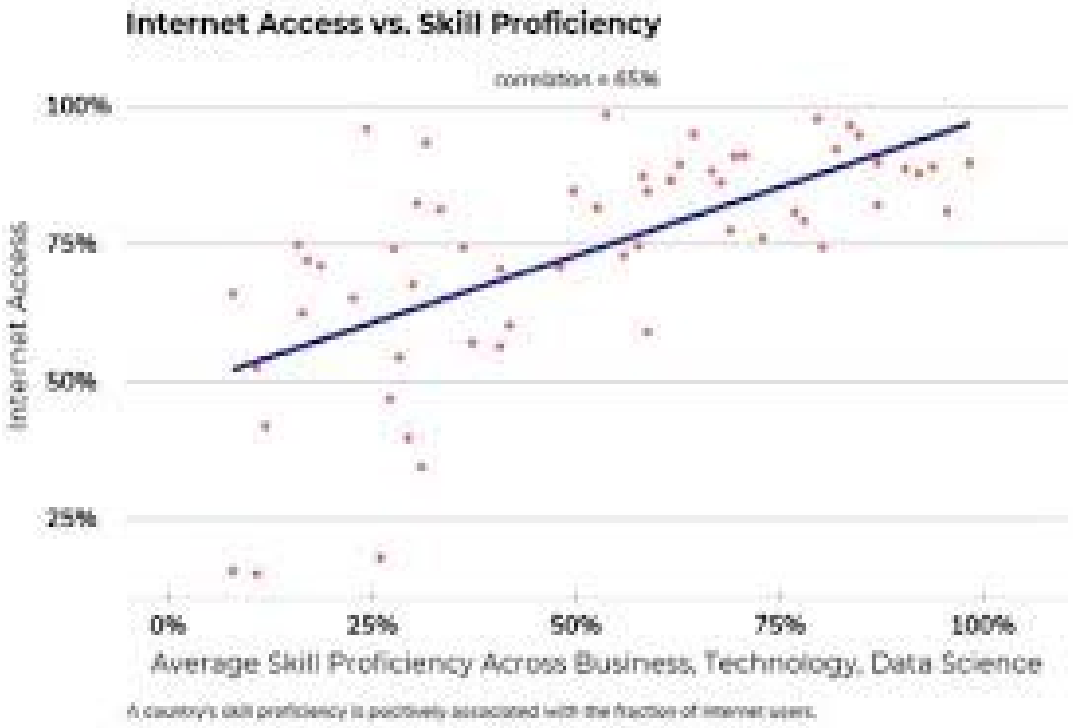

Figure 3: *The impact of Internet access on skills taxonomy*

Moreover, the lack of access to upskilling for the lowest income brackets among future employees can decrease their chances for reskilling, as they continue to assume various

[6] According to the 2022 Report on *the State of Global Skills*, countries in the lowest 25% of learner performance scale had average internet access rates of 54.2%, while those in the highest 25% had access rates of 83.6%.

responsibilities within companies. Therefore, it is up to both employers and universities to address these systemic capacity-building failures so that students, graduates and would-be employees can thrive in a level-playing field.

3.4.2. Upskilling

Upskilling is "those smaller skills gaps you are always filling, like learning the Excel skills you need to manage a project's budget more efficiently, or practicing a few tips to have better performance conversations with your direct report". Filling these smaller skills gaps "can be what gets you better and more productive in your current role and will set you up for that next promotion.[7]" By making learning resources available to senior students and entry-level employees, and involving them in upskilling efforts, demand-side response increases, which constitute a virtuous cycle of continuous learning and better organization performance. Indeed, wider student participation in upskilling can turn the current industry challenge of skill mismatch and the observed lack of 'digital-first economy' job preparedness into an opportunity. In the same vein, the surveys report a strong positive correlation between pro-employee policies, expanding employee-oriented learning opportunities and organizations' bottom-line results[8].

3.4.3. Skill and Confidence Gaps

Gaps in employee and employer perceptions can easily be bridged in high-performing and learning organizations that thrive on « new skilling » and workplace alignment. It goes without saying that reducing the discrepancy in employer-employee sentiment can go a long way towards 're-tooling' employees' skillsets more comprehensively. It should also help unleash their full potential, as job irrelevance and uncertainty decrease and occupational perception becomes more positive.

3.4.4. Best Practice Sharing

Skill and confidence gaps seem to be the common denominator across all industries. Thus, supporting learners when needs arise gives them the opportunity to truly learn new competencies and integrate new behaviors. Most importantly, bridging the identified skill gaps

[7]According to Linda Cai, Vice-president of talent development at LinkedIn, the skills required in the workforce are changing fast. Recent data shows « skillsets for jobs have changed by around 25% since 2015. By 2027, this number is expected to double. » For more information, log onto the following Website : https://www.bbc.com/worklife/article/20220412-what-upskilling-means-for-the-future-of-work

[8] Cornerstone's 2022 *Thriving in the Global Skills Shortage* report identified the differences between organisations classified as 'High Performers', 'Average', and 'Laggards' on the basis of how they were rated across key talent and business categories, including employee development and profitability.

presupposes that all learners were entitled to equal upskilling opportunities, and that best practice sharing became the rule rather than the exception.

3.4.5. Authentic Networking

Embracing the powerful resource of networking to gauge students' future career roles could result in enormous opportunities. As previously stated, hands-on learning experiences can empower students to navigate remote and hybrid work environments as they progress towards graduation. Indeed, internships are the ultimate terrain where senior students can generate their own value proposition and galvanize peer support throughout their learning journey. Besides, the power of professional relationships is likely to solve the series of personal challenges that beset graduates' career pathways, such as introversion, dearth of digital talent and often-chaotic soft skills. Finally, networking can significantly address employability skills' deficiencies within the student cohort, as connected students have easy access to online learning resources, and can reach out to industry leaders across different digital platforms, thus making it easier for them to start a viable career.

3.4.6. Technical and Human Skills

The *Unbounded University* report has refocused the attention on student employability skills and technical capacity building, both believed to better position students and graduates to land job opportunities. More particularly, it displays the importance of "integrating online learning into curricula, thus paving the way for universities to close technical skills gaps"[9]. As illustrated in Figure 4 below, the engineering skills proficiency gaps are sufficient to call the attention to exploring new forms of learning likely to bridge learning gaps and pinpoint long-term career trends in engineering curricula.

On the other hand, there is a consensus that most current in-demand skills are behavioral, which may sometimes even obviate the need for such proxies as certification and titles. Rather, honing one's listening skills, developing resilience in times of hardship and giving constructive feedback to data-weary customers should be given more priority by both universities and employers.

[9] The 2021 *Unbounded University* report reveals that engineering students are trailing behind when it comes to statistical programming, which is the science of using code to analyze big data. Most students would need an average of 45 days of learning to close that skill gap. For more information, download the full report from the following address: https://blog.coursera.org/introducing-the-unbounded-university/

Figure 4: *Skills gaps across a series of engineering modules*

4. towards a Definition of Skills and Competencies

Skills and competencies involve a wholehearted approach to building new capabilities that align with workplace requirements. In today's challenging work environments, learning new skills entails taking charge of one's own destiny through individual skills assessment, and charting personalized learning pathways towards the future. Since its launch, the 'Reskilling Revolution Initiative' has taken into consideration the technology-driven structural changes in the global job market and corresponding need for building new employee skills-sets worldwide. Nevertheless, what has characterized such an initiative was the new paradigm of work and the transformational nature of current re-skilling endeavors[10]. Indeed, skills and competencies have acquired a broader significance in the light of new complex work-related realities[11]. That is, a new typology of skills agenda integrating both normative and reactivist conceptions has moved

[10] According to the World Economic Forum's 'Reskilling Revolution Initiative', the term "new skilling" represents all types of continuous learning to help build high-demand skills, whether an individual is trying to upskill current capabilities, or needs complete re-skilling to build entirely new capabilities.

[11] Log onto the following Website to get more information on the 'Reskilling Revolution Initiative', and how it visualizes a future world of work that is free from unsustainable skills shortages and imminent job losses: https://www.reskillingrevolution2030.org/

to center stage. Largely, this typology compensates for the lack of prescriptive rules of behavior and academic standards, and accommodates context-based skill development schemes. In his article on the future of work, Gorsht (2014) even reports a new skill-mapping approach likely to unravel modern workplace trends. It also provides a predictive analysis of the future job demands in terms of agile skills and competencies, such as Social Intelligence, Cross-cultural Competencies, Transdisciplinarity and Design Thinking[12]. From this perspective, we can easily assume that both digital and human skills constitute a cornerstone to both future employee and organizational performance, as the current digital transformation makes these unique skill categories complementary. Counterintuitively, most thinkers still consider human skills, particularly their cognitive, social, and emotional dimensions, more disruptive as economic expansion makes transferable skills the condition of possibility for successful job search and/or growth despite any alledged skills-mismatch.

5. Skill Mapping in Moroccan Engineering Schools: A Structural-Functional Analysis

Moroccan student engineers successfully combine technical expertise, a hefty dose of business management qualities, as well as practical soft skills and the entrepreneurial drive that would allow them to find creative solutions to innovation challenges. According to Coursera's 2022 *Job Skills Report*, 62% of employers have made a formal effort to move toward skills-first hiring. Instead of total years of experience, skills are fast becoming the preferred qualification for businesses seeking new hires[13]. Generally, school syllabi aim at bridging the gap between advanced student digital and numerical skills, and critical business management awareness, including soft skills components by proposing a learner-oriented study framework. This takes shape in compliance with the provisions set out in the Ministry of Higher Education and Innovation's specifications sheet, let alone the general guidelines on pedagogical and performance objectives, content, planning, methodology, learning assessment and conditions for successful syllabus implementation.

More than a decade ago, engineering students used to conceive of human skills as a subsidiary element, not a constitutive part of systematic learning pathways. Indeed, more emphasis was

[12] For further insights into Reuven Gorsht's contributory article that cites the Institute for the Future's approach to building job-relevant skills and competencies, log onto the following Website: https://www.forbes.com/sites/sap/2022/12/14/3-keys-to-sales-success-personalization-simplicity-and-omnichannel/?sh=2ae40f8141d7

[13] For more information, see *The Job Skills of 2022*. Coursera Publications, 2022.

placed on upgrading hard skills and 'building' docile engineers that were fit for traditional industry jobs. Nowadays, however, modern engineering curricula, more particularly IT-intensive ones, have acquired a new dimension in the sense that a new set of complementary course materials has widened the scope for learning and enriched the students' learning experience. For instance, alongside business management disciplinary expertise came the need for English language skills development, which has utterly captured the interest of most students who, in turn, report a great satisfaction to learn English for practical purposes, rather than for consolidating their knowledge about any Social Science-related field.

In fact, a closer look at the taxonomy of human skills in the context of engineering classrooms would cast light on the advantages of the Arts, Humanities and Psychology-oriented curricula whose importance has grown tremendously in recent years, away from any relations of subordination, or dominance[14]. What seems to embody this new classroom dynamics is a renewed generative approach to leadership that embraces a learning community-building ideology through such new practices as coaching and mentoring. This, in turn, ensures knowledge uptake, influences upskilling and builds capacity to navigate the complex power-laden work structures that characterize the twenty-first century world of work.

From a pragmatic perspective, and with due regard to the merits of information technology and innovation management skills as important disciplinary and career-related objectives for student engineers, two sets of human skill-mapping models are emerging within the engineering classroom: cognitive-pedagogical and social-discursive.

The first model emphasizes school leadership for developing successful learning communities. Here, the focus will be on making curricular innovation and its pedagogical corollary serve broader performance objectives. By way of illustration and taking English language learning as a key performance indicator, this model enables learners to develop communicative competence through listening, speaking, reading and writing. Upon successful completion of this core language component, students will have mastered Level 6 of the 6-level Common European Framework of Reference for Languages (CEFR)[15]. Besides, taking cue from the project-based learning approach, a student-centric approach to learning increasingly reflects the

[14] Contrary to Stuart Hall's Subordination Theory which "works primarily by inserting the subordinate class into the key institutions and structures which support the power and social authority of the dominate order", the classroom learning dynamics has shifted into a more equal territory (Hall 1976, p. 39).

[15] For more information on the CEFR framework, download the user manual from the following Website: https://www.coe.int/en/web/common-european-framework-reference-languages

learning communities' orientation, as teams of students' self-pace their learning pathways by sharing insights, and merging conceptual and fieldwork-based learning. This invariably lays the groundwork for learners to develop higher-order cognitive skills by using English in content learning, by forming lifelong learning habits and building virtual learning communities. Moreover, this model currently enables learners to have an overview of the landscape, people and cultures of some English-speaking countries and develop good attitudes and feelings towards these countries, their people and their languages.

The second model, however, is predominantly job-oriented and socially embedded, as it conceives of the learner discursive and social skills trajectory as a priority for a successful career launch. Here, relevant employability skills are subsumed within a subject-specific context early in the degree program, which is likely to produce generic transferable skills related to employability. In addition, experiential education as a policy option in engineering schools far increases student engagement and enhances focused reflection. This usually occurs through increased community engagement and extra-curricular activities, and by linking internships to classroom learning. In fact, this convergence has drawn support from many student cohorts in the engineering school community, who report increased satisfaction from experiencing learning through early job placement and expatiate on the value of building career-oriented social and professional networks. More importantly, engineering schools have become more socially embedded as modern talent creation has acquired a broader significance. In other words, graduates' skills are increasingly diverted to more effective socially relevant use with a view to addressing present-day and looming societal concerns, which is largely seen as "reflecting a socially-embedded understanding of the university" (Christensen, Gornitzka, & Ramirez, 2019)[16].

6. Employability Skills Framework for Engineering Students

Student-oriented upskilling projects of any scale need to translate a carefully designed learning framework into specific learning tasks with heavy IT involvement, such as developing a new application, implementing major product enhancements, or simply generating new public

[16] This is taken from Brint, Steven's and Ilhan, Ali O's *the Socially-embedded Uiversity*. University of California in Riverside and Ozyegin University (2020). Here, new ideas materialized regarding university emphases on three ascendant priorities for Business and Engineering students, and that merge the above-mentioned skill-mapping models into a coherent conceptual framework, interdisciplinary collaboration, entrepreneurial activities, and diversification.

speaking capabilities. The objective of it all being to produce a successful combination between theory-based school curricula and hands-on learning in such a way as to enable students to experiment newly-acquired skills, ensure proper organizational learning transfer and gauge the skills implication for talent management. Most importantly, skill framework design must be inclusive in terms of the actors involved, as well as systematic when it comes to delivery. Essentially, a three-pronged approach to skill framework analysis has come to the fore, which consists in Design Thinking, Upskilling Delivery and Transformative Governance, and should link together to provide holistic results.

6.1. Design Thinking

Any skill framework analysis should accommodate key areas of the creative design thinking approach that seeks to devise tailor-made, context-specific solutions and learning journeys, and have these solutions trialed no matter how complex the underlying problems may seem. From this perspective, two elements loom large within this configuration: 4IR Capability Building and Practical Experiential Learning (PEL).

6.1.1. Fourth Industrial Revolution (4IR) Capability building

4IR entails a rethink of the formative strategies targeting engineering students. It basically consists in harnessing new knowledge about the human and digital in all learning situations, and teaching how best to apply it to generate new capabilities and ensure stakeholder buy-in. Here, the challenge lies in the way and extent to which teachers employ technology-based solutions to build inclusive diagnostic models of technical and human skills while keeping student performance at the core of change. What I mean by inclusive is the opportunity to make every student an integral part of the transformative learning journey, irrespective of skills-set and expertise levels[17]. From this perspective, school authorities need to embrace and galvanize support for analytics as a unique data-driven solution likely to create and maintain a skills inventory, thereby identifying skills gaps across program levels *(filières)* and subject areas that require immediate remedial action.

6.1.2. Practical Experiential Learning (PEL)

Another direct route to value creation as far as engineering students are concerned is PEL, but two factors essentially affect any capability building enterprise: the student cohort and the chosen *filière*. While some specializations focus on more hands-on learning techniques,

[17] Inclusive diagnostic methods that involve students usually provide data-driven insights on how school authorities can leverage ICTs to attract and retain students. They are also an indication of demand-side training success and the impact of skills-based learning schemes on career outcomes.

management or language skills to fit into the company role, such as *AMOA* engineers, others tend to place more premium on sharpening technological skills, such as Coding and developing technology-based solutions for clients, which mandates different capability-building approaches for student success[18]. PEL, however, seems to be a crosscutting skill-building endeavor which guides students from across all learning pathways to bridge the learning gap, as it usually helps them develop their employability profile before graduation. Company-based internships, for instance, are likely to offer engineering students valuable opportunities for upskilling, and a competitive advantage over their public university peers, who overwhelmingly downplay the significance of internship experience (Eagleman & McNary, 2010). In fact, a set of theories underlie the student-centered learning-by-doing PEL implications and outcomes for engineering students, including the active learning and team-based learning theories which emphasize group activities and instantaneous feedback, but also focus on "students' use of higher-order thinking to complete activities, or participate in discussion in class" (Freeman et al., 2014)[19].

7. Upskilling Delivery: Skills-based learning and Teacher Pedagogy

It is a matter of urgency that Moroccan engineering schools address the critical importance of skills-based learning and its pedagogical underpinnings, as cutting-edge skills and industry-recognized certifications can increase student employability levels. Skills-based learning can also support future enrolment, thereby helping shape a strong organisational reputation, as nothing is more valuable to a school than its brand image. Furthermore, school-based teacher pedagogy is another area for consideration in the sense that learner-centered teaching and student empowerment to pursue personalized disciplinary interests through relevant skills acquisition should be a pre-requisite.

In the same vein, teachers are a powerful institutional resource that should be trained, developed and managed in such a way as to further future engineering talent. Indeed, teacher life-long

[18] In most cases, *AMOA* Engineers operate as Assistants to a contracting authority, which embodies project management support across technical and managerial lines.

[19] Constructivist learning theory emphasizes that individuals learn through building their own knowledge, connecting new ideas and experiences to existing knowledge and experiences to form new or enhanced understanding (Bransford et al., 1999). The theory, developed by Piaget and others, posits that learners either can assimilate new information into an existing framework, or can modify that framework to accommodate new information that contradicts prior understanding. For more information, read David A. Huffaker and Sandra L. Calver's "the New Science of Learning: Active Learning, Metacognition, and Transfer of Knowledge in E-learning Applications." Journal of Educational Computing Research, Vol. 29 (3) 6-8, 2003.

learning should be part of engineering school policies that place premium on student employability skills and industry-bound careers. As competition increases relentlessly and polarization of employment growth into two extremes of a skill-set continuum, i.e., either low-skill or high-skills jobs, progressively characterizes the workplace, it is important for engineering schools to chart a forward-looking curricular pathway that enables them to stay relevant, and teachers could too be made to serve such purpose through various incentives. Based on Gorsht's business-oriented and leadership insights into "the Future of Jobs", where he claims that there are "no old roads to new places, i.e., today's problems cannot be solved with yesterday's logic", a set of new capabilities must be instilled in present-day students as a measure of excellence. Moreover, teachers need to be 'incentivized' to take on these new capabilities effectively, all of which will constitute a powerful upskilling delivery toolbox: Sensemaking, Adaptive Thinking, Computational Thinking, New Media Literacy, Design Mindset, Cognitive Load Management and Virtual Collaboration[20]. It is noteworthy that there is scope for improvement as far as the latter tool is concerned through a carefully designed digital learning environment that delivers learning and maximizes outcome by integrating digital tools and interactive resources to inform course and learning objectives, ultimately developing successful learning communities.

7.1. Transformative Governance

For engineering schools to place learning at an upward path of development, and ensure both teachers' and learners' commitment and positive outcome, good governance mechanisms must be deployed across the spectrum of all education roles, with a special focus on data-driven learning assessment. Here, practical considerations limit this ambition to two priorities; namely, the student and teacher dimensions of institutional reform. To that effect, two action layers are instrumental in bringing about engineering schools' reform and, more broadly, higher education success: student career planning through accurate needs assessment, and continuous monitoring and evaluation of system performance based on stakeholder engagement.

7.1.1. Student Career Planning

Often the focus on employability has been on the second and subsequent years of undergraduate study (e.g. Crebert, Bates, Bell, Patrick, & Cragnolini, 2004); Gamble, Patrick, & Peach, 2010). However, a broader stakeholder engagement analysis usually reveals that students need to

[20] For more details on the proposed teacher's upskilling toolbox for effective engineers, read Gorsht, Reuven's "Are You Ready? Here Are the Top 10 Skills for The Future" from the following Website link : https://www.forbes.com/sites/sap/2014/05/12/are-you-ready-here-are-the-top-10-skills-for-the-future/

develop employability-related skills and experience work-related learning as they transition into their degrees and onwards, as this can aid retention in degree programs (Harris-Reeves & Mahoney, 2017). Additionally, an early start to employability-related skills development is incredibly important for students who wish to take an internship in their first summer break or a year in industry later in their course since they need to be able to demonstrate suitable skills upon early application and secure a placement. This invariably requires accurate and timely needs assessment to be able to determine the actual skills gaps and pre-empt any career misalignment.

7.1.2. Monitoring and Evaluation

In a bid to develop outcome indicators, especially when it comes to student attainment, there is a need to understand what is happening in the classroom and develop the right tools for measuring learning achievements. Interestingly enough, teachers can find various and efficient ways of accessing and managing large quantities of student-related data as a means to assess learning, even if such undertaking presupposes that engineering schools had enough resources to provide timely and adequate training. In fact, using digital tools has a double advantage in the sense that it can help measure student performance in terms of attitude, knowledge and skills for potential data integration, which can go a long way towards consolidating teachers' pedagogical methods, especially when outcome indicators result in the intended intermediate changes. Furthermore, teachers can build on the rich post-assessment information to improve learning, mainly through upgrading relevant lesson methodologies and effectiveness. From this standpoint, student-learning assessments should avert improvisations, or classical mental arithmetic-based measurements. Evaluation should rather be data-driven and preferably captured through a formal monitoring and evaluation framework. For instance, engineering student output documentation largely consists in counting the number and types of modules each one receives, and the length of program enrolment time measured through study periods, thus culminating into two long four-period semesters. More importantly, measuring the frequency with which the students attend class sessions in person, often done on a monthly basis, can reflect their achievement levels, and even condition program completion. Measuring student-learning outcomes; however, only emerges because of the amount of energy and monetary investments it involves[21]. In addition, the lack of willingness, if not stamina, on the

[21] Measuring student-learning outcomes entails the existence of a more ambitious school-based evaluation scheme that targets all engineering program stakeholders, including teachers. Curiously enough, the latter still resist the idea of being part of any institutionally mandated performance evaluation program.

part of school authorities to plan for short, or longer-term learning outcomes further undermines student upskilling dynamics, as the monitoring framework usually targets desired performance-related changes by including specific indicators that explain how the changes need to be measured to achieve a planned outcome. The hypothetical example presented in Table 1 presented below provides a five-component model that could be put into practice by engineering schools in a would-be monitoring and evaluation strategy that aims to measure learning achievements, and that could embrace a holistic and more ambitious student upskilling program.

Table 1: *Model for Five Components within a Student Soft-skills Improvement Program*

Inputs	Activities	Outputs	Short-term Outcomes	Longer-term Outcomes
Subsequent to an English language placement test, a CLIL Program provides four experienced teachers to help fresher and sophomore students across seven *filières* to improve their levels to attend specialized subjects.[22]	1. During weekly sixty-minute sessions, teachers provide practical training in the form of seminars and workshops to student groups of similar language abilities. 2. Teachers individually monitor student progress and identify relevant difficulties. 3. Teachers and students discuss the latter's difficulties, and both seek suitable ways to address them. 4. Teachers share in class and online resources to build student self-confidence.	A majority of students attend the weekly English language sessions with a genuine interest in the subject.	1. Students feel supported and individually supervised. 2. Students stop blaming themselves and others for underperformance and engage with lessons. 3. Students develop more confidence on their abilities. 4. Students become aware of the future opportunities presented by individualized English language coaching. 5. Students develop strategies to study a wide range of English materials on their own and at their own pace.	1. Short-term outcomes persist. 2. Students become fluent in English language. 3. Students land successful internships and start productive careers after graduation.

Conclusion

This paper was an attempt to lay the basis for a theoretical discussion on human skills development in the Moroccan engineering schools' context against the backdrop of changing skills frameworks and learning landscape across both companies and higher education institutions. Based on field experience and a thorough examination of the relevant scientific

[22] The term Content and Language Integrated Learning (CLIL) was originally defined in 1994, and launched in 1996 by UNICOM, University of Jyväskylä and the European Platform for Dutch Education, to describe educational methods where 'subjects are taught through a foreign language with dual-focused aims, namely the learning of content, and the simultaneous learning of a foreign language'. For a better understanding of the CLIL concept, download Steve Darn's article from the following Website address: https://files.eric.ed.gov

documents, I sought to foreground a specific learning model likely to produce graduates who are responsive to new career demands in terms of socially adaptive skills, cognitive functions, emotional set-up and linguistic performance, geared to helping them land successful jobs and avoid prospective career misalignment. Essentially, the skill-mapping process, which unraveled after years of local participatory observation, uncovered a cluster of existing and job-oriented students and graduates' skills, but remains tentative and needs further inquiry to consolidate these assets. For example, in-session presentation drills for freshers would need to feature high among the teachers' priorities in their attempt to pinpoint mandatory public speaking and research coherence skills, thereby timely addressing any cognitive and social interaction skills shortages.

Guest speaker invitation would also be an important skills measurement tool, as prompting is usually conducive to behavior shaping, learning reinforcement, and concomitant skill acquisition. Finally, school-sponsored event management, targeted at sophomores and senior students' internship placement, would turn to be an additional student career-centered undertaking since it would allow them to adjust their behaviors based on new situational variables, and build long-term social adaptability competencies and emotional intelligence in the face of change dictated by exceptional circumstances. From this perspective, while recognizing that student engineers tend to have a higher than average cognitive ability, ICT-related alertness and pragmatic attitude towards the changing job market compared to the general higher education student population, there is still a need to expand the scale and scope of the skill-mapping approach. For instance, more effort is needed to consolidate cross-regional data-driven skills assessment strategies and learning analytics framework in engineering schools as a means to enhancing students and graduates' disciplinary and transferable skills profiles, thus ensuring a smooth transition to the workplace.

Besides, using the human skill-mapping framework; namely, the social-discursive dimension and cognitive-pedagogical component as key student performance indicators, this paper revealed that English language competence and other relevant soft skills are good predictors of students and graduates' employability against market demands. Finally, continuous monitoring and evaluation of system performance alongside learning assessment was another avenue for consideration, as sound governance mechanisms entail best practices and ensure alignment of all stakeholders' various interests. What I mean by good governance is the all-encompassing management system, best practices and leadership role played by decision makers at every level, and that give preeminence to the administrative, pedagogical, political, psychosocial,

environmental and ethical dimensions of work. Only a successful combination of these variables can unleash the potential of students, ensure personal commitment and create a shared vision for all. Further research, however, should improve our understanding of higher education governance issues and enable us to tap the potential of engineering graduates even further as they get themselves ready to embrace the world and start rewarding careers.

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Conflict of interests

I have no conflicts of interest to declare and no financial interest to report

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