International Journal of Instruction *April 2024 ● Vol.17, No.2*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*
pp. 259-282

Article submission code: 20230314120332
Received: 14/03/2023 Revision: 13/09/2023
Accepted: 01/10/2023 OnlineFirst: 03/01/2024

Perceived Employability of Moroccan Engineering Students: a PLS-SEM Approach

Aniss Qostal
Sidi Mohamed Ben Abdellah University, Morocco, *aniss.qostal@usmba.ac.ma*

Khadija Sellamy
University Ibn Tofail, Morocco, *khadija.sellamy@uit.ac.ma*

Zineb Sabri
University Ibn Tofail, Morocco, *zineb.sabri@uit.ac.ma*

Hamza Nouib
Ibn Tofail University, Morocco, *hamza.nouib@uit.ac.ma*

Younes Lakhrissi
Sidi Mohamed Ben Abdellah University, Morocco, *younes.lakhrissi@usmba.ac.ma*

Aniss Moumen
Ibn Tofail University, Morocco, *aniss.oumoumen@uit.ac.ma*

This study aims to build an employability model on the skills of young Moroccans, their perceptions of the competencies towards the labour market, and enhance the understanding of the employment landscape through an exploratory study based on the Conference Board of Canada (Employability Skills 2000+). Therefore, the competencies and skills under discussion are presented according to the Employability Skills 2000+ model; comprising Fundamental skills (FS), Personal Management Skills (PMS), and Teamwork skills (TWS). Accordingly, the approach used the Confirmatory Factor Analysis (CFA) and the Structural Equation Modeling (SEM) with SmartPLS software. The primary data was collected through a survey of Moroccan engineering students from the ENSAK (National School of Applied Sciences of Kenitra in English) belonging to the Ibn Tofail University of Kenitra. The survey participants included 411 students from six departments, relying on the non-probability and voluntary response sampling methodology. Finally, the results obtained revealed different perceptions regarding the priorities of certain skills in the labor market; where Personal Management Skills (PMS), Teamwork Skills (TWS), and Work Safely (WS) were perceived as highly demanded in the professional context with a medium effect on the model. Otherwise, the remains elements and features have a small effect and impact on the model, especially the fundamental skills and its sub-constructs.

Keywords: employability model, employability skills 2000+, confirmatory factor analysis, structural equation modeling, engineering students, SmartPLS software

Citation: Qostal, A., Sellamy, K., Sabri, Z., Nouib, H., Lakhrissi, Y., & Moumen, A. (2024). Perceived employability of moroccan engineering students: a PLS-SEM approach. *International Journal of Instruction*, *17*(2), 259-282. https://doi.org/10.29333/iji.2024.17215a

INTRODUCTION

Context of the research

Nowadays, the integration of young people and fresh graduates in the labour market has been the main question and challenge for different sciences, fields of research, and organizations to enhance the chances and mitigate the difficulties faced by young people in the professional world. Unfortunately, during the year 2020, the global labour market witnessed various factors including the Covid-19 pandemic(International Labour Organization, 2021), trade restrictions, and the closure of territories, which led to a deterioration characterized by a decline in the global economy, job destruction, a reduction in the number of working hours, and an increase in the unemployment rate(International Labour Organization, 2022). In fact, the Moroccan situation was not an exception, and according to the reports of the HCP (High Commission for Planning), the unemployment rate has increased between 2020 and 2021 by 2 points from 10.5 percent to 12.5 percent (Lopez-Acevedo et al., 2021). Moreover, the data adopted from the International Labour Organization (ILO) and the USAID agency has shown an inflammation of the global unemployment rate among Moroccan young people aged 15 to 24 and 25 to 34 reaching the percentage of 31 percent and 18.5 percent respectively, which is considered very high in the MENA region (Middle East and North Africa) where young people are two to three times more likely to face unemployment than other groups in society (Akerbib et al., 2020; Lopez-Acevedo et al., 2021).

Mainly, in recent years, the Moroccan objective and through multiple entities and programs including the Moroccan Economic and Social Council (ESC) (2012) and Morocco's National Employment Strategy (NES) (plan 2015-2025) is to increase the chances of higher graduates in their integration into the labour market; through their preparation, their adaptation to multiple factors, the improvement of work environments, and strengthening the competitiveness of graduates with a high level of knowledge (technical and generic skills), where ESC reports indicate the role of the training process in determining and evaluating higher education in the professional world(Titna Alaoui et al., 2011). Nevertheless, the big responsibility for the training process, the preparation, and the adaptation of higher graduates is based on the education system represented by the Moroccan university. Moreover, the Moroccan university is considered as the backbone of human resources development with the required competencies for the labour market. Therefore, based on the last data adopted from the Statistics of the Public University between 2022-2023 (Ministére de l'Education National Maroc, 2023), the total number of students registered in the public university near to 1 million students (989,899 students) compared to 921,944 students on 2019-2020, distributed over 153 establishments and pursuit on 2,648 accredited courses. Paradoxically, the teaching tasks are carried out by 15,325 permanent teachers where the number of students exceeds the norm per teacher, varying between 83 and 126 students for each teacher, imposing questions on the quality of education, skills, the efficiency and productivity of Moroccan graduates towards the labor market requirements(Tejan & Sabil, 2019).

Accordingly, the question of employability among Moroccan students and higher graduates has been the subject of investigations in terms of qualities and skills, in particular the development of a model capable of giving a good interpretation and presentation of the actual situation and possible improvements in the future where employability skills are highly valued in the professional world(Chaibate et al., 2019). Therefore, the determination of students' and graduates' perceptions of the skills needed to access the labour market and of their self-assessments is still very limited(Chaibate et al., 2019). In this context, the research focused on the existing capacities of Moroccan students for our case the students of ENSAK, where the choice of the Kenitra region comes from the economic potential of this region, it is home to nearly (24%) of the total number of nationally declared companies, it is also home to 13.7% of all workers aged 15 and over in second place after the Casablanca-Settat region. On the other hand, the unemployment rate was also considered high compared to the national average with 11.9% in third position after the regions of Casablanca-Settat and Fez-Meknes(Oumaima & Abdelhamid, 2022).

Furthermore, the ultimate objective of the current research goes beyond the general idea of employability as simply obtaining a job for graduates but broadens the understanding of the internal and external factors influencing the success of Moroccan graduates in the professional context, where the Australian Chamber of Commerce and Industry considered employability skills as "skills required not only to gain employment but also to progress within an enterprise to achieve one's potential and contribute successfully to enterprise strategic directions" (Bridgstock, 2009). Moreover, the studies carried out on professional performance have focused on the expectations of each actor related to the employability process. Accordingly, (Rosenberg et al., 2012) divided these entities into three main stakeholders (graduates, faculty, and recruiters). Nevertheless, the examination of the expectations of the first entity presented on graduates in the Moroccan context is still underdeveloped compared to the two entities (faculty and recruiters)(Aziz & Zaidoune, 2022; Tejan & Sabil, 2019), where the current research could serve as a basis to complete the puzzle on the employability in the Moroccan context through exploring the expectations of the Moroccan graduates in particular on the needed skills in the era of 4IRs and AI. Therefore, a way of developing the model based on the graduate perspectives on their employment skills can be through the three main hypotheses based on the Employability Skills 2000+, namely:

Theory H1: Fundamental skills including its elements are positively related to the employability of Moroccan graduates.

Theory H2: Personal management skills including its elements are positively related to the employability of Moroccan graduates.

Theory H3: Teamwork skills including its elements are positively related to the employability of Moroccan graduates.

The article is organized as follows; the first section deals with the literature and related works on the models developed for the identification of skills and the employability of graduates; the second section deals with the methodology adopted in this article, the

survey used, target population; the third section details the findings and interpretation of results.

Literature review and research models

The determination of the relationship and the correlation between the development of competencies and skills of young people and their chances of employability in the workplace has been the main subject for many researchers in many aspects, where Prahalad and Hamel defined the necessary competencies required for the professional purpose as "the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies"(Ljungquist, 2013). Mainly, and according to many research(Laker & Powell, 2011), those competencies can be defined by two major qualities: technical skills refer to the hard skills needed to perform specialized tasks related to the field of work (Hendarman & Cantner, 2018; Rainsbury et al., 2002). On the other hand, the non-technical competencies known as soft and generic skills are categorized as personal knowledge and transferable in the workplace, namely: emotional intelligence, interpersonal and social skills, communication skills, problem-solving, team working, creative thinking, decision-making, and leadership skills as defined by the British National Skills Task Force "Generic skills - those transferable skills, essential for employability which are relevant at different levels for most." (Bridgstock, 2009; Kearns, 2001). Nevertheless, the relevance of both types of skills in the definition of the capabilities of each graduate towards the professional world and the potential employers, previous studies showed the focus on developing hard skills, and a leak on the development of generic skills for graduates during the training process (Subedi, 2018). Where (Chaibate et al., 2019) recognized in the Moroccan context the need to improve the initiative skills of engineering graduates, in particular with the Fourth Industrial Revolution (Industry 4.0).

Accordingly, adopting an exploratory approach to identify the dominant factors related to employability including skills, is essential for all involved stakeholders(Laker & Powell, 2011; Rosenberg et al., 2012). Where (Tejan & Sabil, 2019) emphasized and highlighted the positive perception of generic competencies namely communication from the employer's point of view regarding the competencies of graduates. Furthermore, through an exploratory analysis(Loué & Majdouline, 2015) recognized that those skills are not only important from the point of view of the employer, but they are relevant for the personal improvement of young people in the entrepreneurial experience. In addition, (Abaida et al., 2017) defined the positive impact of the development of generic skills in the professional context and the improvement of the wages of higher education graduates in the Moroccan context. Otherwise,(Aniss et al., 2021) explored in the Moroccan context the new ways of examining the skills sought by potential employers related to soft skills including the personality traits of the young engineers of ENSAK, where many characteristics namely: conscientiousness, openness to new experience, and extraversion are highly demanded.

As mentioned above to understand the global factors, qualities, and skills affecting the employability of young people. Different models have been developed to assess the effectiveness of processes related to measuring the impact (negative & positive) of each

skill in improving the employability of graduates (Jackson, 2014); where the USEM model (Knight & Yorke, 2002) based on four pillars including Understanding, Skills, Efficacy beliefs, and Metacognition (including thinking). Alternatively, the CareerEDGE model (Dacre Pool & Sewell, 2007) has gained prominence as a basis in this context, focusing on five dimensions including Career (learning development), Experience (work and life), and knowledge of the subject of the degree, generic skills and emotions as predictors for Self-Efficacy, Self-esteem, and Self-confidence as the basis of the degree of employability. Thus, and according to most models relating to employability, we can deduce that several factors act together in the integration and career of young people in the professional world.

METHOD

Approach and questionnaire

The study is based on the exploratory approach and quantitative analysis (QA). Previously, many studies have elaborated on quantitative skills (QS), especially for students with a background in science or engineering where the ability to use mathematical and statistical thinking is considered the main tool in the professional context(Harun et al., 2017; Matthews et al., 2013). Otherwise, other research based on the Science Students Skills Inventory (SSSI) has found students in biomedical sciences in Australia have good perceptions of their soft skills such as communication (oral and written) and teamwork compared to the quantitative skills(Matthews & Hodgson, 2012). Accordingly, the current study tries to apply quantitative analysis to the three main skills of the employability skills 2000+ model (Fundamental, Personal Management skills, and Teamwork skills) for the student from ENSAK where the model includes the quantitative skills and the soft skills (Table 1).

In the literature, the employability surveys are divided into two major models, the Employability Skills Questionnaire (ESQ) oriented on generic skills and the specific competencies related to the fields of research to meet at first place the perception of the workplace, on another hand to evaluate the existence of competencies and try to match and find gaps presented on the Job Performance Questionnaire (JPQ) (Abas-Mastura et al., 2013). The employability skills 2000+ model combine the two models ESQ and JPQ on dividing the major skills needed on the profiles of graduates on three main axes. Firstly, the Fundamental Skills, grouping the major skills required as the basics competencies related to communication, interpersonal, problem solving, and the use of numbers skills as a way to evaluate the level of exchange of information in different manners and within the professional environment, and the degree of imagination and creativity in the problem resolving process. The second axis is presented by the Personal Management skill; where the focus is primarily on the personal skills, attitudes, and behaviors related to confidence valued by employers, in addition to resource management skills, adaptation to different situations, and continuous learning as a means of development skills. Finally, the third axis is related to teamwork skills where the share, cooperation, and coordination of tasks within the group are very crucial for competitiveness in the professional world such as the management, negotiation, participation, and determination of tasks within the group.

Table 1
The employability skills 2000+ survey

Fundamental Skills (FS): The skills needed as a base for further development	Personal Management Skills (PMS) : The personal skills, attitudes, and behaviors that drive one's potential for growth	Teamwork Skills (TWS): The skills and attributes needed to contribute productively
Communication (COM) ✓ Com1: Read and understand the information presented in a variety of forms. ✓ Com2: write and speak clearly ✓ Com3: listen and ask questions ✓ Com4: share information through multiple manners. ✓ Com5: use relevant methods to skills to explain and clarify ideas	Demonstrate Positive Attitudes and Behaviors (PAB) ✓ PAB1: self-confidence ✓ PAB2: behaviors toward others ✓ PAB3:Appreciation of good efforts ✓ PAB4: personal health ✓ PAB5: interest, initiative, and effort	Work with Others (WO) ✓ WO1: work within the dynamics of the group ✓ WO2: understand teams objectives ✓ WO3: flexibility and openness to opinions. ✓ WO4: respect people's diversity and differences. ✓ WO5: accept and provide feedback ✓ WO6: sharing information and expertise within the team ✓ WO7: lead, motivate and support the group ✓ WO8: understand the role of conflicts in a group ✓ WO9: manage and resolve conflicts within the group
Manage Information (MI) ✓ MI1: gathering and organizing information ✓ MI2: access, analyze and apply knowledge and skills from various disciplines	Be Responsible (BR) ✓ BR1: Balancing work and personal life ✓ BR2: manage resources(time and money) ✓ BR3: managing risk ✓ BR4: action accountable ✓ BR5: socially responsible	
Think and Solve Problems (TSP) ✓ TSP1: assess situations and identify problems ✓ TSP2: seek different points of view and evaluate them based on facts ✓ TSP3:regonize scientific, interpersonal, and technical dimensions of the problem ✓ TSP4: identify the root cause of the problem ✓ TSP5: be creative and innovative in exploring possible solutions ✓ TSP6: readily use science, technology, and mathematics as ways to think, gain, share knowledge, solve problems, and make decisions. ✓ TSP7: evaluate solutions to make recommendations or decisions. ✓ TSP8: implement solutions ✓ TSP9: check to see if a solution works, and act on opportunities for improvement	Be Adaptable (BA) ✓ BA1: work independently ✓ BA2:handle multi-task ✓ BA3: be innovative ✓ BA4: be open to change ✓ BA5:learn and evaluate mistakes ✓ BA6: cope the uncertainly	Participate in Projects & Tasks (PPT) ✓ PPT1: plan, and design project and task from start to finish. ✓ PPT2: develop a plan, seek feedback, text, and revise the implementation ✓ PPT3: agreed quality standards ✓ PPT4: use appropriate tools for tasks and projects ✓ PPT5: adapt to changing requirements and information. ✓ PPT6: monitor and identification of ways to improve the success of the project and task
Using Numbers (UN) ✓ UN1: decide what needs to be measured or calculated ✓ UN2: observe and record data using appropriate methods, tools, and technology ✓ UN3: make estimates and verify calculations	Learn Continuously (LC) ✓ LC1: continuously learn ✓ LC2: personal strengths ✓ LC3: learning goals planning ✓ LC4: identify learning sources ✓ LC5: achieve learning goals	
	Work Safely (WS) ✓ WS1: be aware of safe practices for the personal and group health	

The outputs and independent variables related to students' perceptions of the importance of each factor tested from the survey are shown below in Table 2.

Table 2
The outputs and the independent variables (The employability skills 2000+ survey)

Constructs	Independents Variables(Outputs)
Fundamental Skills	FS1: The importance of communication for the Fundamental Skills
	FS2: The importance of Manage Information Skills for the Fundamental Skills
	FS3: The importance of Using Numbers Skills for the Fundamental Skills
	FS4: The importance of Think and Solve Problems Skills for the Fundamental Skills
Team Work Skills	TM1: The importance of the Work with Others Information Skills for the Team Work Skills
	TM2: The importance of the Participate in Projects and Tasks Skills for the Team Work Skills
Personal Management Skills	PMS1: The importance of Demonstrate Positive Attitudes and Behaviors for the Personal Management Skills
	PMS2: The importance of Be Responsible for the Personal Management Skills
	PMS3: The importance of Be Adaptable for the Personal Management Skills
	PMS4: The importance of Learn Continuously for the Personal Management Skills
	PMS5: The importance of Work Safely for the Personal Management Skills
Employability	FS: The importance of Fundamental Skills for the employability
	TM: The importance of Team Work Skills for the employability
	PMS: The importance of Personal Management Skills for the employability

Sampling and data collection method

The questionnaire was distributed to the students of the ENSAK (Table 3), where the ENSA network (Ecole Nationales des Sciences Appliquées in French) is a large network of engineering schools in Morocco with eleven establishments spread across the main regions. The network hosts thousands of students each year in various research fields related to the professional labour market. The survey was distributed over one year from January 2022 to January 2023; the students' responses were collected through the Google Form application respecting the confidentiality of personal information.

The population of the sample contains 411 respondents, from six departments (Electrical Engineering, Networks and Systems Telecommunications, Computer Engineering, Automotive Mechatronics Engineering, Industrial Engineering, Civil Engineering). The survey was based on the non-probability and voluntary response sampling methodology, focused on the students of the common cycle trunk (first 3 years) and specialized trunk (4th year and 5th year), where the goal is to understand the perspectives and perceptions of different groups of students about their competencies towards the professional market and to identify the gaps between real competencies and the needs in the professional world for further improvement. The measurement method used is the Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree).

Table 3
Information and characteristics of respondents (sample = 411 students)

Establishment	Department	Total
ENSA Kenitra	Electrical Engineering	142
	Networks and Systems Telecommunications	57
	Computer Engineering	86
	Automotive Mechatronics Engineering	86
	Other(Industrial Engineering, Civil Engineering)	40
Gender	Man	164
	Women	247
Age	17-20	171
	21-25	240
National	National	390
	Foreign	21

Thus, it is essential to determine the adequate sample size respecting the population under study, in particular for the purpose of testing hypotheses. Accordingly, many formulas can be used including Steven K. Thompson (Thompson, 2012), where the populations sizes are defined (The total number of ENSAK students and the total number of students from all Moroccan ENSAs in 2022 are N_1=1,967 and N_2 = 12,960 respectively), the default margin of error (d) = 5%, the default z-score is 1.96 with confidence level is 95%.

$$n = \frac{\mathbf{N} \times P(\mathbf{1} - P)}{\left[(\mathbf{N} - \mathbf{1})\left(\frac{\mathbf{d}^2}{z^2}\right)\right] + p(\mathbf{1} - P)}$$

Answer: the required sample size for the population N_1=1,967 is n_1=313 and N_2=12,960 is n_2=373. The sample size collected is n = 411.

Experimental Design, Materials, and Methods

Analysis Approach

The analysis process of the collected data was carried out with the Smart PLS software (v. 4.0.7.6) based on Structural Equation Modeling (SEM). The use of this type of model (SEM) is justified by the fact that it is widely used for identification of the causal relationships and expresses hierarchical or non-hierarchical, recursive, or non-recursive structural equations (Gefen et al., 2000). For our case, the main question is the identification of the relation between observable variables presented on perceived skills acquired and latent variables as indicators for the employability of students as an outcome of the models. Mainly, the confirmatory of the model is based on the confirmatory factor analysis (CFA) and path analysis (PA), where the confirmatory factor analysis (CFA) is considered an essential statistical approach for the validity of the test and the reliability of the hypothesis on the relationship between the factors under study and the latent variables (Marsh et al., 2014). Otherwise, the path analysis (PA) (Schreiber et al., 2006) is a statistical method for testing and quantifying the relationships between the observable factors to determine the correlation, direct and indirect association among variables under investigation and test the validity of the model as an interpretation of the outcomes and the predictors. Accordingly, the main

objective of the model based on the employability skills 2000+ survey is to estimate the impact of each three major components and their sub-elements and verify the hypothesis test, especially from the perceptions of the engineering students.

Methods and measurements approach

The analysis process is based on previous studies and guidelines related to the PLS-SEM as described by Hair (Hair et al., 2019; Sarstedt et al., 2017). The first step relies and focuses on the assessment of the measurement model where the validity and the internal consistency reliability are tested on two sub-steps, convergent validity and discriminate validity. The second step related to the measurement of the structural model to the determination of three coefficients R^2, f^2, and Q^2 respectively additionally to the hypotheses (P-value) and goodness of fit (GoF) (Table 4).

Table 4
PLS-SEM modeling process based on (Hair et al., 2019; Sarstedt et al., 2017)

Step 1: Assessment of Measurement Model	Step 2: Measurement of Structural Model
Convergent Validity:	✓ Coefficient of determination of the endogenous constructs (R^2>0.19)
✓ Factor Loadings (Loading > 0.7)	✓ Effect size (f^2> 0.02)
✓ Average Variance Extracted (AVE > 0.5)	✓ Predictive relevance (Q^2>0)
✓ Individual item reliability (α > 0.7)	Hypotheses Testing (Path coefficient):
✓ Composite reliability (CR > 0.7)	✓ T-value=1.96; p-value < 0.05
Discriminant Validity:	The Goodness of Fit of the Model:
✓ Formell-Larcker criterion	✓ GoF > 0.01
✓ Loading and cross-loading criterion	

FINDINGS AND DISCUSSIONS

Assessment of Measurement Model

Convergent Validity

The assessment quality of the model and its constructs is evaluated through the testing of multiple indicators as shown in Table 5, starting with The Factor Loading as described as "the extent to each of the items in the correlation matrix correlate with the given principal component. Factor loading can range from -1.0 to +1.0, with higher absolute values indicating a higher correlation of the item with the underlying factors"(Pett et al., 2003). The recommended value should be above 0.708 to explain more than 50 percent of the indicator variances(Hair et al., 2019). Secondly, the validity and the acceptance of the test depend on the square root value of the AVE of each element, where the measurement for each construct should be greater with its sub-elements compared to other constructs. The Internal Consistency Reliability relies on two indicators, the composite reliability (CR) index values of 0.70 and 0.90 range from satisfactory to good. Thirdly, Cronbach's alpha (α) is the common measurement of Internal Consistency Reliability; where a value of 0.7 or higher is solicited for an acceptable internal consistency(Ursachi et al., 2015).

Table 5
Measurement Model Analysis Result

Construct	Sub-Construct	item	Convergent Validity		Internal Consistency Reliability		
			Cross Loading (>0.5)	AVE >0.50	Cronbach alpha(α) >0.70	Composite Reliability >0.70	Rho_A
Fundamentals Skills (FS)	Communication (COM)	05	0.842 0.882	0.743	0.914	0.935	0.916
	Manage information (MI)	02	0.903 0.916	0.827	0.792	0.905	0.794
	Using Numbers (UN)	03	0.892 0.915	0.814	0.886	0.929	0.887
	Think and Solve Problems Skills (TSP)	09	0.776 0.964	0.718	0.950	0.958	0.954
Teamwork Skills (TWS)	Work with Others (WO)	09	0.822-0.875	0.719	0.951	0.958	0.951
	Participate in Projects & Tasks (PPT)	06	0.848-0.877	0.746	0.932	0.946	0.933
Personal Management Skills (PMS)	Demonstrate Positive Attitudes and Behaviors Skills (PAB)	05	0.870 0.895	0.794	0.871	0.921	0.875
	Be Responsible Skills (BR)	05	0.848-0.881	0.758	0.920	0.940	0.923
	Be Adaptable(BA)	06	0.832 0.976	0.776	0.942	0.954	0.945
	Learning Continuously (LC)	05	0.873 0.918	0.803	0.939	0.953	0.940
	Work Safly(WS)	01	1.000	1.000	1.000	1.000	1.000

Discriminate Validity

The discriminate validity test based on the Fornell-Larcker criterion (1981) compares the variance of the AVE square root value of each construct and the shared variance with other constructs (Hair et al., 2021), the validity of the test estimate a higher AVE squared value of each latent variable compared to the correlation with other constructs (Table 6).

Table 6
Discriminate validity test based on the Fornell-Larcker criterion

	BA	BR	COM	PAB	FS	LC	MI	PPT	PMS	TWS	TSP	UN	WS	WO	EMP
BA	0.881														
BR	0.827	0.870													
COM	0.751	0.747	0.862												
PAB	0.811	0.855	0.762	0.856											
FS	0.713	0.721	0.820	0.708	0.819										
LC	0.820	0.826	0.762	0.838	0.697	0.896									
MI	0.665	0.721	0.805	0.699	0.780	0.705	0.910								
PPT	0.789	0.814	0.761	0.803	0.763	0.805	0.757	0.864							
PMS	0.850	0.858	0.775	0.855	0.724	0.860	0.725	0.796	0.827						
TWS	0.687	0.701	0.660	0.692	0.618	0.738	0.610	0.771	0.717	0.889					
TSP	0.809	0.809	0.812	0.811	0.732	0.815	0.785	0.843	0.817	0.719	0.847				
UN	0.749	0.771	0.799	0.766	0.805	0.755	0.736	0.786	0.782	0.642	0.823	0.902			
WS	0.685	0.738	0.662	0.735	0.633	0.729	0.682	0.696	0.756	0.619	0.719	0.710	1.000		
WO	0.828	0.830	0.772	0.826	0.761	0.823	0.720	0.815	0.818	0.753	0.826	0.780	0.695	0.848	
EMP	0.725	0.678	0.696	0.709	0.686	0.730	0.612	0.690	0.761	0.737	0.713	0.685	0.633	0.761	0.795

From Table 5 and Table 6, the square root of the AVE is superior to the correlations of this construct compared to the other constructs. While the cross-loading confirms the higher values of the latent variables of each construct than with the other variables of the model.

Measurement of Structural Model

Accordingly, to measure the structural model, multiple coefficients related to the goodness of the model were tested. The coefficients of determination (R^2), the path coefficients (β), and the effect size (f^2) were used (Table 7)(Hair et al., 2019, 2021; Sarstedt et al., 2017). The (f^2) values showed different significant effects of each element on the model; firstly, the totality of the elements of the fundamental construct have a positive effect and small effect size, where the UN (0.124) have most effect on the fundamental construct compared to the rest of sub-constructs where COM (0.075) and MI (0.049) have less effect, while TSP (0.029) is the last element on the fundamental skills where the effect is small compared to others and the totality of elements of the model. Secondly, The WS (0.285) has a medium effect size with the highest effect on the Personal Management Skills and the totality of the model. Otherwise, the rest of the elements have a small effect on the PMS where BA (0.113), LC (0.070), ER (0.036), and PAB (0.034) have a positive effect on the PMS. Otherwise, both WO and PPT have a positive effect on the TM where PPT (0.203) medium effect and WO (0.129) small effect on TM. Finally, the overall (f^2) effects of fundamental (0.062), personal management (0.140), and teamwork (0.175) have a positive and significant effect on the employability index, where Teamwork Skills (TWS) has the most effect on the overall effect on the employability index. The predictive relevance (Q^2) values are all superior to zero indicating a positive predictive value. Finally, the Goodness of Fit of the model is very strong (GoF = 0.63639104> 0.36).

Table 7
Effect size (f^2)

Constructs		f^2	Signification
Fundamental Skills	Communication	0.075	Small effect size
	Manage Information	0.049	Small effect size
	Use Numbers	0.124	Small effect size
	Think and Solve Problems	0.029	Small effect size
Personal Management Skills	Demonstrate Positive Attitudes and Behaviors	0.034	Small effect size
	Be Responsible	0.036	Small effect size
	Be Adaptable	0.113	Small effect size
	Learn Continuously	0.070	Small effect size
	Work Safely	0.285	Medium effect size
Teamwork Skills	Work with Others	0.129	Small effect size
	Participate in Projects and Tasks	0.203	Medium effect size
Employability	Fundamental Skills	0.062	Small effect size
	Personal Management Skills	0.140	Small effect size
	Teamwork Skills	0.175	Medium effect size

Figure 1
Structural equation modeling analysis

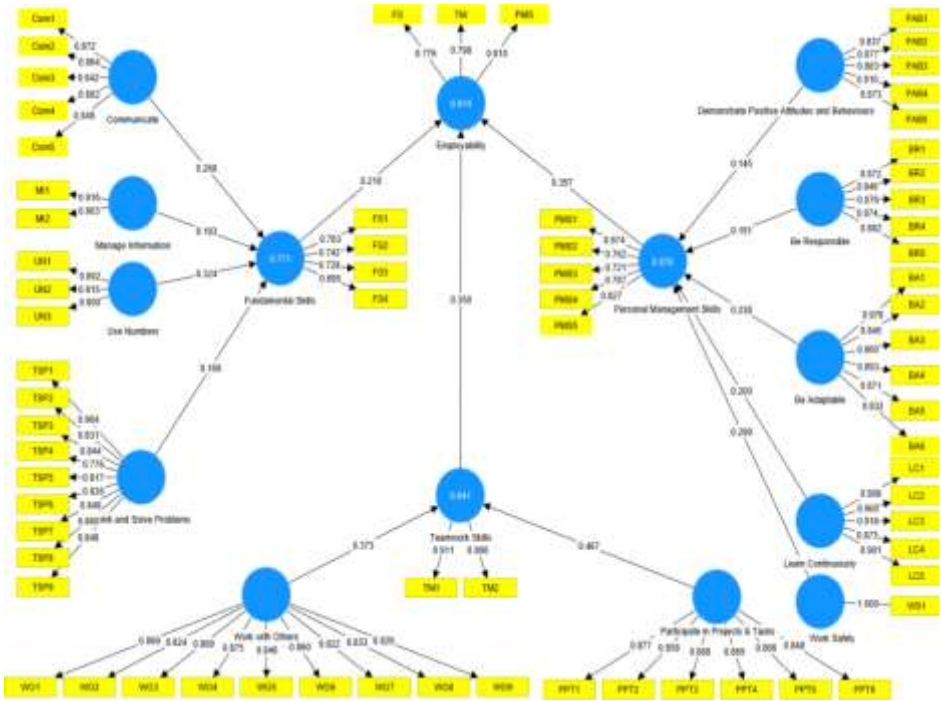

Figure 2
Measurement and structural model - Output SmartPLS

Table 8
Hypothesis testing results

Hypo	Description	Adapted By	P-value	Decision
H1	Communication -> Fundamental Skills	(Andrews & Higson, 2008; Clokie & Fourie, 2016)	0.000	Accepted
H2	Manage Information-> Fundamental Skills	(Kolding et al., 2018)	0.000	Accepted
H3	Use Numbers -> Fundamental Skills	(Durrani & Tariq, 2012)	0.000	Accepted
H4	Think & Solve Problem -> Fundamental Skills	(Andrews & Higson, 2008; Belzer & Kim, 2018)	0.006	Accepted
H5	Work with Others Skills ->Teamwork Skills	(Kozlowski, 2018; Kozlowski & Ilgen, 2006)	0.000	Accepted
H6	Participate in Projects and Tasks ->Teamwork Skills	(Kozlowski, 2018; Kozlowski & Ilgen, 2006)	0.000	Accepted
H7	Demonstrate Positive Attitudes and Behaviors Skills->Personal Management Skills	(Sermsuk et al., 2014)	0.005	Accepted
H8	Be Responsible Skills->Personal Management Skills	(Sermsuk et al., 2014)	0.001	Accepted
H9	Be Adaptable Skills->Personal Management Skills	(Idkhan et al., 2021)	0.000	Accepted
H10	Learn Continuously Skills -> Personal Management Skills	(Kolding et al., 2018)	0.000	Accepted
H11	Work Safely Skills->Personal Management Skills	(Ogundipe et al., 2018)	0.000	Accepted
H12	Fundamentals Skills-> Employability Skills	(Abas & Imam, 2016)	0.000	Accepted
H13	Teamwork Skills-> Employability Skills	(Mainga et al., 2022)	0.000	Accepted
H14	Personal Management Skills-> Employability Skills	(Sermsuk et al., 2014)	0.000	Accepted

According to the structural equation modeling analysis and based on the essential coefficients of each construct (ß, t-static, R^2, Q^2, and GoF) (Figure 1) and the results of hypothesis tests (Table 5) could provide views on the real challenges and professional requirements facing future graduates. Thus, the results of the SmartPLS showed the impact and the priority of the three main axes on the employability index based on the perceptions of the students (Figure 2).

DISCUSSION

Fundamental Skills

Despite the importance of the fundamental skills as a key to the employability of fresh graduates (Nguyen, 1998; Webb & Chaffer, 2016), the perception of students of this construct is still low where the beta coefficient and t-value are less evaluated compared to the other constructs (H12. ß = 0.210; t = 4.024; p = 0.000). Firstly, The Using Number sub-construct (UN) that refers to numeracy skills are highly valued according to students' perceptions and has a significant and positive impact on the fundamental elements(H3. ß = 0.324; t = 5.947; p = 0.000). The precedent studies have shown clear ideas on the importance of numeracy skills for employers(Belzer & Kim, 2018), where 98% of employers considered numeracy as 'important' or 'very important' competence within the professional context, and half of the potential employers use numeracy evaluation on the recruitment tests(Durrani & Tariq, 2012; Hack-Polay, 2020). On the other hand, 28% of employers describe the UN as ‘occasionally’ or ‘never’ demonstrated skills by graduates (Durrani & Tariq, 2012). Paradoxically, whilst half of the students (51%) admitted the UN as a primordial skill to the professional context, a student in one of the focus groups remarked that he would not apply for a job that required too much in the way of numeracy skills (Durrani & Tariq, 2012; McMurray et al., 2016). Secondly, the valued skills within the fundamental constructs are the communication skills (H1. ß = 0.268; t = 4.282; p = 0.000). Communication skills are

considered from the point of view of employers as an important key to the professional context and the employability of new graduates as a way to exchange their ideas properly and interact with their environment in many manners, where communication is ranked in the top ten of the most important skills and capabilities looked for in the new graduates, with a total of 90% of organizations under survey (Matsouka & Mihail, 2016; Moore & Morton, 2017; Succi & Canovi, 2020). Accordingly, the students' views showed a positive effect of communication skills on fundamental skills, the revealed finding showed their awareness of the necessity of the improvement of communication skills to keep up with new challenges in the labor market. Therefore, in precedents research(Clokie & Fourie, 2016; Idkhan et al., 2021), students generally consider only their academic skills and neglect the improvement of their skills in communication, especially the skills of interacting with others and explaining ideas clearly with relevant manners. In addition, Employers always consider students' communication skills as a "gap" and report as the most common limitation on the skills needed in the market and acquired during the student background, where the use of living languages like English in writing reports, messages and making acceptable oral speeches or presentations with clear ideas still a challenge and struggle for graduates employability(Pham, 2022).The manage information(MI) construct is the third positively considered (H2. ß = 0.193; t = 3.617; p = 0.000) where the loading factors of its elements are the highest values (MI1=0.916, MI2=0.903) among the fundamental skills, the importance of the MI construct is given form the relation with gathering, processing and analyzing information to make decision and solution, where (Meyer & Cranmore, 2020) emphasized on developing the ability to access and gathering information and be able to interpret that information and use adequate tools for analyzing and processing to make right decisions as a part of information management skills (Jewell et al., 2020; Pinto et al., 2010). Paradoxically, The Think and Solve Problem (TSP) construct which related to creative thinking skills and problem-solving skills; where management, identification, and solving problems by using specific knowledge and techniques, including the mental disciplines necessary to solve complex problems(Lawson, 2003). In fact, there is no doubt that students who develop TSP skills during their careers will have more chances and advantages in the professional environment in terms of integration and promotion in the professional context. Furthermore, the engineering students linked their engineering sciences with their ability to solve problems and find innovative solutions to difficulties and unexpected situations (Kirn & Benson, 2018). However, the perception of students on the importance of TSP within the fundamental construct is less compared to the precedent skills (H4. ß = 0.169; t = 2.756; p = 0.003), the result can be related to the modern actualities where those capabilities face challenges from the emergences of new technologies and even AI where the machine become a great obstacle for the new generation to develop their skills (TSP), Furthermore the barriers often face the integration of those skills on the education process, where the major challenges could be summarized on the lack of training, limited resources, biased preconceptions, and time constraints(Snyder & Snyder, 2008). Likewise, the learning scenarios during the education process can enhance those skills such as; the group work method, the project method and the problem solving techniques(Hadromi et al., 2021).

Personal Management Skills

Personal management skills (PMS) are highly valued in the professional context and considered an essential element for the employment of students, with most employers prioritizing soft and PMS skills in the job market over technical skills(Sermsuk et al., 2014; Shola. F et al., 2019; Succi & Canovi, 2020). The analysis of students' perceptions of their capacity related to personal management skills (PMS) including the five axes (Demonstrate Positive Attitudes and Behaviors, Be Responsible, Be Adaptable, Learn Continuously, and Work Safely) revealed the PMS as the most considered construct within the three constructs related to the employability index(H14. ß = 0.357; t = 6.873; p = 0.000). Accordingly, the students considered at the first place the Work Safely (WS) sub-construct as positively related to the PMS (H11. ß = 0.299; t = 7.885; p = 0.000), Work Safety(WS) sub-construct which related at the first place the capacities and strategies must be taken to ensure the own safety and the safety of others on the professional context(Sermsuk et al., 2014). Therefore, based on the research on the employers' perceptions, working safely is a very important feature within the PMS context, the finding ranks the WS on the top PMS where those skills can boost the professional behaviors of employees toward risks within their professional environments(Abas & Imam, 2016). Secondly, the consideration of the Be Adaptable Skills (BA) sub-construct (H9. ß = 0.238; t = 5.557; p = 0.000) as a key for their employability and essential element for PMS, where to be adaptable and flexible to unpredictable challenges in the professional context is considered as key for a good integration in the labors market for employee where conditions tend to be complex(Sony & Mekoth, 2022). The third valued construct based on the students' perceptions is the up-skilling process of competencies presented on the Continuous Learning construct (CL), which is related to the process of developing new skills needed in the labour market at different stages of the career known as the Long-Life Learning (LLL concept) (Quendler & Lamb, 2016; Kolding et al., 2018). The understanding of the importance of CL comes from the point of view of students in our research (H10. ß = 0.200; t = 4.416; p = 0.000) and can be explained as they are considering the acquired competencies within the academic process are not enough to guaranty good integration and promotion in the labour market. Furthermore, Erik Brynjolfsson and Andrew McAfee insist on the importance of the continuous improvement of skills as a sustainable activity over time including ideation, large-frame pattern recognition, and complex communication. Actually, the traditional education programs during the graduation process of students are not enough to ensure employment, especially in the era of 4IR and AI, where the machine has taken more place over human capabilities (Brynjolfsson et al., 2014). However, (Mainga et al., 2022) admitted that based on the perceptions of employers and graduates, the CL is at the bottom of the list of the primordial skills needed especially for the first employment. Moreover, certain models cannot determine the implication and the engagement the graduates in the learning process, and even the measurement of results in terms of self-assessment and self-evaluation of the Lifelong Learning process in improving practices needed to keep up with the changes in the professional context (Duffy & Holmboe, 2006).

The remaining elements on the PMS including The Be Responsible skills (H8. ß = 0.151; t = 3.376; p = 0.000), Demonstrate Positive Attitudes and Behaviors (PAB) (H7. ß = 0.145; t = 2.782; p = 0.009) have less significance but still positively correlated to the PMS, where(Sermsuk et al., 2014) indicates from the point of view of employers considered Demonstrate Positive Attitudes and Behaviors (PAB) and Be Responsible skills (BR) with a "High level" of significance for the employability of new graduates, as well as(Abas-Mastura et al., 2013), where PAB and BR received the highest preference on the skills on the PMS from government agencies and considered them as fundamental PMS skills to maintain their competitiveness on the professional context. Additionally, the same study showed positive employees' perceptions of their PAB abilities and rated them as "very competent". Otherwise, even the consideration of the importance of the PAB skills of both stakeholders, employers always express their dissatisfaction with the PMS of their employees(Abas-Mastura et al., 2013).

Teamwork Skills

Teamwork skills (TWS) have always been at the center of discussions as essential qualities needed in the professional context, where the ability to work with others in different conditions can define the employability of new graduates (Hughes & Jones, 2011; Lacerenza et al., 2018). The importance of teamwork competencies involves coordination, cooperation, and mastery of other elements of personal qualities, especially communicating with other members of the team to accomplish planned tasks. Accordingly, the Colleges and Universities (AAC&U) revealed in a study the relevance of teamwork skills according to the perception of employers, where 71% insist on the ability to collaborate with others as an indicator of the employability of graduates (Hart Research Association, 2010). Furthermore, previous studies on the perceptions of stakeholders related to the employability of graduates agreed on the importance of working with others as the key to improving group work skills, where 90% of employers insist on the importance of these skills Work with Others (95%) and Participate in Projects and Tasks (98%), especially the cooperation at work(Abas-Mastura et al., 2013; Sermsuk et al., 2014).

Understanding the impact of teamwork capabilities through the measurement of the qualities of working among others begins and the definition of "what is a team and what is teamwork skills", such as the ability to work harmoniously and effectively with the other team member, to anticipate everyone's needs, to inspire trust and to communicate effectively where (Morgan et al. 1986) adapted seven dimensions related to teamwork skills and behaviors, namely: (1) Giving suggestions or criticism, (2) Cooperation, (3) Communication, (4) Team spirit and morale, (5) Adaptability, (6) coordination, (7) Acceptance of suggestions or criticism (Driskell et al., 2018). In addition, (Kozlowski & Ilgen, 2006) defined a two-pronged strategy to improve skills and teamwork results based on the one hand the development of interpersonal interaction, enhance the know-how skills of the group through the consolidation of their collective capacities, on the other hand, the good determination of the main objective with the related tasks can affect the result of the whole group work.

Accordingly, the result obtained from the distributed survey on the teamwork aspect shows the positive perception of the students on their capabilities of working within the

group as an indicator of employability (H13. ß = 0.350; t = 5.871; p = 0.000). The finding lines with(Idkhan et al., 2021) research where teamwork skills are well evaluated (average loading factor with 0.888) as well as for our research with the totality of the sub-elements had positive effects (Table 7, Table 8) on the model. Moreover, the majority of the sub-elements of Work with Others (H5. ß = 0.373; t = 6.517; p = 0.000) are highly loaded with an average factor loading of (0.863) which can be perceived as good indices for the perceptions of the students of the importance of that quality the employability of new graduate. The second axis related to teamwork skills is the Participate in Projects and Tasks (H6. ß = 0.467; t = 8.571; p = 0.000), where all elements are validated with an average of factor loading(0.836), the results are in line with the study conducted by (Idkhan et al., 2021) as a baseline on the loading factor has the high value and loading (0.874). Furthermore, participation in different tasks and projects is considered an opportunity to improve skills and knowledge on the capabilities of designing tasks & projects, planning testing, seeking feedback, using different tools based on needs, and being able to adapt to different changing requirements.

RECOMMENDATIONS

Today's job market is more complex than it was in the past, including the challenging factors that graduates will face in their professional context in the future. In particular, when the difference in expectations and priorities for needed skills among stakeholders, including employers, education, and graduates is considerable (Chhinzer & Russo, 2018; Finch et al., 2013; Jackson & Wilton, 2017). Moreover, the finding from the current research about the perceived graduates' skills based on the employability 2000+ model lined with previous research where the expectation and priorities skills between educators are criticized by graduates and employers on the priorities of the technical skills at the expense of generic skills (Ramadi et al., 2016; Webb & Chaffer, 2016).

Additionally, the complexity of the actual challenges in the job market comes from emerging technologies, the digital era, 4IR, and AI (Mn et al., 2020). Paradoxically, in the Moroccan context and emerging countries, communication skills and the use of technology are not considered important for the employability skills of graduates (Mansour & Dean, 2016; Ramadi et al., 2016). Accordingly, further research should consider identifying gaps between existing and futuristic skills in the labour market. Moreover, expanding the scope of studies to cover the role of the Moroccan university in improving fundamental skills and the use of technology for graduates, in particular, the role of the university in improving the employability of graduates is essential(Qenani et al., 2014)

CONCLUSION

The study focused on the employability skills of graduates, in our case, the research attempted to build a global vision based on the ENSAK engineering students' perceptions of the labour market and their abilities in fundamental, personal management, and teamwork skills. The results indicated a high perception of certain qualities with a medium effect on the model, namely: Personal Management Skills (PMS), Teamwork Skills (TWS), and Work Safely (WS). Otherwise, the remains

elements and features have a small effect and impact on the model, especially the fundamental skills and its sub-constructs, where previous researches indicate the same finding. Moreover, previous researches on employers' perceptions and assessment of their employees' skills and the profiles of new graduates have shown a gap between the two stakeholders' perceptions of priority capabilities. Accordingly, further researches may focus on other entities involved in the employment process to understand better the labour market environment, including factors, needs, and the gap between stakeholders' perceptions, including education, training, and a graduate preparation system to improve understanding of the students, skills, and labour market ambiguities.

REFERENCES

Abaida, A., Lakrari, Y., & Abdouni, A. (2017). An examination of the relationship between competences and wages of higher education graduates : Evidence from Morocco. *Tuning Journal for Higher Education*, *5*(1), 75-100. https://doi.org/10.18543/tjhe-5(1)-2017pp75-100

Abas, M. C., & Imam, O. A. (2016). Graduates' Competence on Employability Skills and Job Performance. *International Journal of Evaluation and Research in Education (IJERE)*, *5*(2), 119. https://doi.org/10.11591/ijere.v5i2.4530

Abas-Mastura, M. C., Imam, O. A., Siang, D., & Osman, S. B. (2013). *Employability Skills and Task Performance of Employees in Government Sector*. https://api.semanticscholar.org/CorpusID:17904450

Akerbib, R., Bernard, D. L., Bordat, S. W., Jazouli, A., Kouzzi, S., & Mouline, F. (2020). *USAID/Morocco Gender Analysis Final Report*. Bernard, D.L., and Bordat, S.W. https://talmgroup.com/wp-content/uploads/2021/07/USAIDMOROCCO-Gender-Analysis.pdf

Andrews, J., & Higson, H. (2008). Graduate Employability, 'Soft Skills' Versus 'Hard' Business Knowledge : A European Study. *Higher Education in Europe*, *33*(4), 411-422. https://doi.org/10.1080/03797720802522627

Aniss, Q., Aniss, M., & Younes, L. (2021). The role of social networks in personality analysis for recruitment of laureates : A systematic review and exploratory study. *SHS web of conferences*. https://doi.org/10.1051/shsconf/202111905004

Aziz, S., & Zaidoune, S. (2022). Moroccan higher education teachers' perceptions of the most important soft skills for employability. *International Journal of Social Science and Human Research*, *5*(10), 4534-4545. https://ijsshr.in/v5i10/Doc/17.pdf

Belzer, A., & Kim, J. (2018). We Are What We Do : Adult Basic Education Should Be About More Than Employability. *Journal of Adolescent & Adult Literacy*, *61*(6), 603-608. https://doi.org/10.1002/jaal.693

Bridgstock, R. (2009). The graduate attributes we've overlooked : Enhancing graduate employability through career management skills. *Higher Education Research & Development*, *28*(1), 31-44. https://doi.org/10.1080/07294360802444347

Brynjolfsson, E., McAfee, A., & Spence, M. (2014). *New World Order : Labor, Capital, and Ideas in the Power Law Economy*. *93*(4), 44-53. http://www.jstor.org/stable/24483556

Chaibate, H., Hadek, A., Ajana, S., Bakkali, S., & Faraj, K. (2019). A Comparative Study of the Engineering Soft Skills Required by Moroccan Job Market. *International Journal of Higher Education*, *9*(1), 142. https://doi.org/10.5430/ijhe.v9n1p142

Chhinzer, N., & Russo, A. M. (2018). An exploration of employer perceptions of graduate student employability. *Education + Training*, *60*(1), 104-120. https://doi.org/10.1108/ET-06-2016-0111

Clokie, T. L., & Fourie, E. (2016). Graduate Employability and Communication Competence : Are Undergraduates Taught Relevant Skills? *Business and Professional Communication Quarterly*, *79*(4), 442-463. https://doi.org/10.1177/2329490616657635

Dacre Pool, L., & Sewell, P. (2007). The key to employability : Developing a practical model of graduate employability. *Education + Training*, *49*(4), 277-289. https://doi.org/10.1108/00400910710754435

Driskell, J. E., Salas, E., & Driskell, T. (2018). Foundations of teamwork and collaboration. *American Psychologist*, *73*(4), 334-348. https://doi.org/10.1037/amp0000241

Duffy, F. D., & Holmboe, E. S. (2006). Self-assessment in Lifelong Learning and Improving Performance in Practice : Physician Know Thyself. *JAMA*, *296*(9), 1137. https://doi.org/10.1001/jama.296.9.1137

Durrani, N., & Tariq, V. N. (2012). The role of numeracy skills in graduate employability. *Education + Training*, *54*(5), 419-434. https://doi.org/10.1108/00400911211244704

Finch, D. J., Hamilton, L. K., Baldwin, R., & Zehner, M. (2013). An exploratory study of factors affecting undergraduate employability. *Education + Training*, *55*(7), 681-704. https://doi.org/10.1108/ET-07-2012-0077

Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural Equation Modeling and Regression : Guidelines for Research Practice. *Communications of the Association for Information Systems*, *4*(7). https://doi.org/10.17705/1CAIS.00407

Hack-Polay, D. (2020). Are graduates as good as they think? A discussion of overconfidence among graduates and its impact on employability. *Education + Training*, *63*(3), 377-391. https://doi.org/10.1108/ET-10-2018-0213

Hadromi, H., Sudarman, S., Yudiono, H., Budiman, F. A., Majid, M. N., & Permana, K. N. C. (2021). The learning strategy based on scientific approach to strengthen the employability skill of teacher candidates. *International Journal of Instruction*, *14*(2), 551-570. https://doi.org/10.29333/iji.2021.14231a

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R : A Workbook*. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(1), 2-24. https://doi.org/10.1108/EBR-11-2018-0203

Hart Research Association. (2010). Raising the bar : Employers' views on college learning in the wake of the economic downturn. *Association of American Colleges and Universities*. http://hdl.voced.edu.au/10707/457768

Harun, H., Salleh, R., Baharom, M. N. R., & Memon, M. A. (2017). Employability skills and attributes of engineering and technology graduates from employers' perspective : Important vs. Satisfaction. *Global business and management research*, *9*(1s), 572.

Hendarman, A. F., & Cantner, U. (2018). Soft skills, hard skills, and individual innovativeness. *Eurasian Business Review*, *8*(2), 139-169. https://doi.org/10.1007/s40821-017-0076-6

Hughes, R. L., & Jones, S. K. (2011). Developing and assessing college student teamwork skills. *New Directions for Institutional Research*, *2011*(149), 53-64. https://doi.org/10.1002/ir.380

Idkhan, A. M., Syam, H., Sunardi, S., & Hasim, A. H. (2021). The Employability Skills of Engineering Students' : Assessment at the University. *International Journal of Instruction*, *14*(4), 119-134. https://doi.org/10.29333/iji.2021.1448a

International Labour Organization. (2021). *Rapid Labour Force Survey on the Impact of COVID-19 in Morocco* (p. 34). https://www2019.ilo.org/wcmsp5/groups/public/---africa/---ro-abidjan/---sro-cairo/documents/publication/wcms_809431.pdf

International Labour Organization. (2022). *Trends 2022 ILO Flagship Report World Employment and Social Outlook EMBARGO*. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_834081.pdf

Jackson, D. (2014). Testing a model of undergraduate competence in employability skills and its implications for stakeholders. *Journal of Education and Work*, *27*(2), 220-242. https://doi.org/10.1080/13639080.2012.718750

Jackson, D., & Wilton, N. (2017). Perceived employability among undergraduates and the importance of career self-management, work experience and individual characteristics. *Higher Education Research & Development*, *36*(4), 747-762. https://doi.org/10.1080/07294360.2016.1229270

Jewell, P., Reading, J., Clarke, M., & Kippist, L. (2020). Information skills for business acumen and employability : A competitive advantage for graduates in Western Sydney. *Journal of Education for Business*, *95*(2), 88-105. https://doi.org/10.1080/08832323.2019.1610346

Kearns, P. (2001). *Generic Skills for the New Economy. Review of Research.* ERC. https://fr.scribd.com/document/321494889/generic-skills-for-new-economy-review-602-pdf

Kirn, A., & Benson, L. (2018). Engineering Students' Perceptions of Problem Solving and Their Future. *Journal of Engineering Education*, *107*(1), 87-112. https://doi.org/10.1002/jee.20190

Knight, P. T., & Yorke, M. (2002). Employability through the curriculum. *Tertiary Education and Management*, *8*(4), 261-276. https://doi.org/10.1080/13583883.2002.9967084

Kolding, M., Sundblad, M., Alexa, J., Stone, M., Aravopoulou, E., & Evans, G. (2018). Information management – a skills gap? *The Bottom Line*, *31*(3/4), 170-190. https://doi.org/10.1108/BL-09-2018-0037

Kozlowski, S. W. J. (2018). Enhancing the Effectiveness of Work Groups and Teams : A Reflection. *Perspectives on Psychological Science*, *13*(2), 205-212. https://doi.org/10.1177/1745691617697078

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Psychological Science in the Public Interest*, *7*(3), 77-124. https://doi.org/10.1111/j.1529-1006.2006.00030.x

Lacerenza, C. N., Marlow, S. L., Tannenbaum, S. I., & Salas, E. (2018). Team development interventions : Evidence-based approaches for improving teamwork. *American Psychologist*, *73*(4), 517-531. https://doi.org/10.1037/amp0000295

Laker, D. R., & Powell, J. L. (2011). The differences between hard and soft skills and their relative impact on training transfer. *Human Resource Development Quarterly*, *22*(1), 111-122. https://doi.org/10.1002/hrdq.20063

Lawson, M. J. (2003). Problem Solving. *International Handbook of Educational Research in the Asia-Pacific Region*, 511-524. https://doi.org/10.1007/978-94-017-3368-7_35

Ljungquist, U. (2013). Adding dynamics to core competence concept applications. *European Business Review*, *25*(5), 453-465. https://doi.org/10.1108/EBR-09-2012-0052

Lopez-Acevedo, G., Betcherman, G., Khellaf, A., & Molini, V. (2021). *Morocco's Jobs Landscape : Identifying Constraints to an Inclusive Labor Market*. The World Bank. https://doi.org/10.1596/978-1-4648-1678-9

Loué, C., & Majdouline, I. (2015). Les compétences de l'entrepreneur marocain : Validation quantitative d'un référentiel. *Revue internationale P.M.E.*, *28*(2), 159-189. https://doi.org/10.7202/1032836ar

Mainga, W., Daniel, R. M., & Alamil, L. (2022). Perceptions of Employability Skills of Undergraduate Business Students in a Developing Country : An Exploratory Study. *Higher Learning Research Communications*, *12*(1). https://doi.org/10.18870/hlrc.2022.v12i1.1257

Mansour, B. E., & Dean, J. C. (2016). Employability Skills as Perceived by Employers and University Faculty in the Fields of Human Resource Development (HRD) for Entry Level Graduate Jobs. *Journal of Human Resource and Sustainability Studies*, *04*(01), 39-49. https://doi.org/10.4236/jhrss.2016.41005

Marsh, H. W., Morin, A. J. S., Parker, P. D., & Kaur, G. (2014). Exploratory Structural Equation Modeling : An Integration of the Best Features of Exploratory and Confirmatory Factor Analysis. *Annual Review of Clinical Psychology*, *10*(1), 85-110. https://doi.org/10.1146/annurev-clinpsy-032813-153700

Matsouka, K., & Mihail, D. M. (2016). Graduates' employability : What do graduates and employers think? *Industry and Higher Education*, *30*(5), 321-326. https://doi.org/10.1177/0950422216663719

Matthews, K. E., & Hodgson, Y. (2012). The science students skills inventory : Capturing graduate perceptions of their learning outcomes. *International Journal of Innovation in Science and Mathematics Education*, *20*(1). https://openjournals.library.sydney.edu.au/CAL/article/view/6648/7294

Matthews, K. E., Hodgson, Y., & Varsavsky, C. (2013). *Factors influencing students' perceptions of their quantitative skills*. *44*(6), 782-795. https://doi.org/10.1080/0020739x.2013.814814

McMurray, S., Dutton, M., McQuaid, R., & Richard, A. (2016). Employer demands from business graduates. *Education + Training*, *58*(1), 112-132. https://doi.org/10.1108/ET-02-2014-0017

Meyer, M. S., & Cranmore, J. (2020). Supporting the information gathering practices of academically advanced college-bound students. *Psychology in the Schools*, *57*(7), 1057-1076. https://doi.org/10.1002/pits.22372

Ministére de l'Education National Maroc. (2023). *Statistiques Universitaires-Enseignement Supérieur Universitaire Public 2022-2023* (p. 31). https://www.enssup.gov.ma/en/statistiques

Mn, K., Khalid, F., & Husnin, H. (2020). Preparing Graduates with Digital Literacy Skills Toward Fulfilling Employability Need in 4IR Era : A Review. *International Journal of Advanced Computer Science and Applications*, *11*(6). https://doi.org/10.14569/IJACSA.2020.0110641

Moore, T., & Morton, J. (2017). The myth of job readiness? Written communication, employability, and the 'skills gap' in higher education. *Studies in Higher Education*, *42*(3), 591-609. https://doi.org/10.1080/03075079.2015.1067602

Nguyen, D. Q. (1998). The essential skills and attributes of an engineer : A comparative study of academics, industry personnel, and engineering students. *Global J. of Engng. Educ*, *2*(1), 65-75.

Ogundipe, K. E., Ogunde, A. O., Olaniran, H. F., Ajao, A. M., Ogunbayo, B. F., & Ogundipe, J. A. (2018). Missing gaps in safety education and practices : Academia

perspectives. *International Journal of Civil Engineering and Technology (IJCIET)*, *9*(1), 273-289. https://core.ac.uk/download/pdf/154230079.pdf

Oumaima, E. R., & Abdelhamid, A. B. (2022). L'entrepreneuriat au Maroc entre financement et promotion. *Zenodo (CERN European Organization for Nuclear Research)*. https://doi.org/10.5281/zenodo.6421753

Pett, M., Lackey, N., & Sullivan, J. (2003). *Making Sense of Factor Analysis*. SAGE Publications, Inc. https://doi.org/10.4135/9781412984898

Pham, T. (2022). Communication Competencies and International Graduates' Employability Outcomes : Strategies to Navigate the Host Labour Market. *Journal of International Migration and Integration*, *23*(2), 733-749. https://doi.org/10.1007/s12134-021-00869-3

Pinto, M., Doucet, A.-V., & Fernández-Ramos, A. (2010). Measuring students' information skills through concept mapping. *Journal of Information Science*, *36*(4), 464-480. https://doi.org/10.1177/0165551510369633

Qenani, E., MacDougall, N., & Sexton, C. (2014). An empirical study of self-perceived employability : Improving the prospects for student employment success in an uncertain environment. *Active Learning in Higher Education*, *15*(3), 199-213. https://doi.org/10.1177/1469787414544875

Quendler, E., & Lamb, M. (2016). Learning as a lifelong process - meeting the challenges of the changing employability landscape : Competences, skills and knowledge for sustainable development. *International Journal of Continuing Engineering Education and Life-Long Learning*, *26*(3), 273. https://doi.org/10.1504/IJCEELL.2016.078447

Rainsbury, E., Hodges, D. L., Burchell, N., & Lay, M. C. (2002). Ranking workplace competencies : Student and graduate perceptions. *Asia-Pacific Journal of Cooperative Education*, *3*(2), 8-18. https://hdl.handle.net/10289/3219

Ramadi, E., Ramadi, S., & Nasr, K. (2016). Engineering graduates' skill sets in the MENA region : A gap analysis of industry expectations and satisfaction. *European Journal of Engineering Education*, *41*(1), 34-52. https://doi.org/10.1080/03043797.2015.1012707

Rosenberg, S., Heimler, R., & Morote, E. (2012). Basic employability skills : A triangular design approach. *Education + Training*, *54*(1), 7-20. https://doi.org/10.1108/00400911211198869

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial Least Squares Structural Equation Modeling. In C. Homburg, M. Klarmann, & A. Vomberg (Éds.), *Handbook of Market Research* (p. 1-40). Springer International Publishing. https://doi.org/10.1007/978-3-319-05542-8_15-1

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results : A Review.

The Journal of Educational Research, *99*(6), 323-337. https://www.jstor.org/stable/27548147

Sermsuk, S., Triwichitkhun, D., & Wongwanich, S. (2014). Employment Conditions and Essential Employability Skills Required by Employers for Secondary School Graduate. *Procedia - Social and Behavioral Sciences*, *116*, 1848-1854. https://doi.org/10.1016/j.sbspro.2014.01.482

Shola. F, B., Latib, A. A., Samari, R., Kamin, Y., Saud, M. S., & Amin, N. F. (2019). The non-technical skills needed by graduates of technical colleges in metalwork technology. *International Journal of Evaluation and Research in Education (IJERE)*, *8*(4), 654. https://doi.org/10.11591/ijere.v8i4.20308

Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Journal of Research in Business Education*, *50*(2), 90. http://dme.childrenshospital.org/wp-content/uploads/2019/02/Optional-_Teaching-Critical-Thinking-and-Problem-Solving-Skills.pdf

Sony, M., & Mekoth, N. (2022). Employee adaptability skills for Industry 4.0 success : A road map. *Production & Manufacturing Research*, *10*(1), 24-41. https://doi.org/10.1080/21693277.2022.2035281

Subedi, N. B. (2018). Soft Skills as Employability Skills : Fundamental Requirement for Entry-level Jobs. *KMC Research Journal*, *2*(2), 133-142. https://doi.org/10.3126/kmcrj.v2i2.29956

Succi, C., & Canovi, M. (2020). Soft skills to enhance graduate employability : Comparing students and employers' perceptions. *Studies in Higher Education*, *45*(9), 1834-1847. https://doi.org/10.1080/03075079.2019.1585420

Tejan, O. A., & Sabil, A. (2019). Understanding Employers' Perception of Employability Skills and Career Development in Morocco. *International Journal of Education and Literacy Studies*, *7*(2), 134. https://doi.org/10.7575/aiac.ijels.v.7n.2p.134

Thompson, S. K. (2012). *Sampling* (Third Edition P:59-60). John Wiley & Sons, Inc. https://doi.org/10.1002/9781118162934

Titna Alaoui, M., Kettani, M., Ghannam, A., & Alaoui, A. M. (2011). *Emploi des jeunes*. Conseil Economique et Social, Maroc. http://www.cese.ma/media/2020/07/Rapport-du-Conseil-Economique-et-Social-Emploi-des-jeunes.pdf

Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia Economics and Finance*, *20*, 679-686. https://doi.org/10.1016/S2212-5671(15)00123-9

Webb, J., & Chaffer, C. (2016). The expectation performance gap in accounting education : A review of generic skills development in UK accounting degrees. *Accounting Education*, *25*(4), 349-367. https://doi.org/10.1080/09639284.2016.1191274