

# Coach-ing, an integrated system of skills: experimentation and guided validation

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*Abstract*– The Coach Ing model, applied to professionals in the engineering field, continues to be enriched through training experiments. After a careful evaluation of the results of the Coach-Ing path [1], this paper shows the results of a further experimentation performed in SAPIENZA - University of Rome. The experimentation was focused on the identification of a numerical evaluation technique of the skill level acquired by the students participating in the program. This was achieved through the guided validation of the set of 16 reference skills defined by the Coach-Ing model. During the training process a double level activity was carried out: on the one hand, the participants were taught about the possible working scenarios to which they could orientate themselves and, at the same time, assessed the personal strategies - observation and evaluation of the 16 parameters - more coherent to effectively propose itself in different working contexts. Further two steps (a unconventional final exam and a follow-up on the interview) integrated the students' training path and at the same time enriched the Coach-ing model with further reference indicators with communicative-relational indicators. The results of the complete experimentation confirm that the Coach-Ing model has excellent performances as a methodological lever within the training path. Moreover, the use of Mentor-Ing techniques allows to accompany the participants in the consolidation of the acquired skills.

*Keywords:* Coach-Ing - Model – Ability - Capability

## 1. Introduction

The use of the Coach-Ing model in training paths is aimed at collecting data to support the generative thesis of experimentation.

The reinforcement of soft skills, identified by the Coach-Ing model, offers engineers more and stronger ability to enter the world of work [1, 2, 3, 4].

The first results and data of the Coach-Ing experimentation path has been illustrated at the WEF [1] last November. It has been followed by a further application in a training course called "The Entry into the world of work: tools, scenarios and strategies", held at the Department of Astronautical, Electrical and

Energy Engineering (DIAEE) of the University of Rome La Sapienza (October-December 2017).

In this program, the Coach-Ing model has been tested as a methodological tool, with the contribution of a Professional Coaches Team to support the participants to enhance the acquired soft skills. So the Coach-Ing model, born from the merger of the Coaching Strategy and Technical Engineering, has been used as a training strategy and as a system of skills to be transferred to the participants.

The following is the synthesis of the first application of the Coach-Ing Skills Model and the results of the second experiment carried out with the help of the Department of Astronautics Engineering, Electrical and Energy (DIAEE) The University Sapienza of Rome.

## 2. The Coach-Ing Skills Model: the first experimentation

The Coach-Ing methodology has been experimented and statistically validated by a large number of on-the-field activities, which have been conducted at the Council of Engineers of the Province of Rome and in some of the most important European high tech enterprises working in the Defence sector.

The Coach-Ing Model blends coaching strategies and the systematic and programmatic approach of engineering. It has been developed as learning non-conventional model to develop new creative and innovative behaviours and capabilities.

In the first experiment conducted on a group of engineers (free lance and employed), numerical indicators has been collected to evaluate and quantify - at a statistical level - the improvement of soft skills in designing life an professional projects. [1, 2, 3, 4].

The Coach-Ing model refers to both the strategic approach of coaching and the systemic and

programmatic approach of engineering to design a structured process towards a defined outcome. The model allows the user to start from his or her knowledge and technical skills to create an original problem-solving system through the coaching approach. In addition, since coaching exploits the relationship and interaction between individuals, a multiplicative factor of intelligence and co-creation is produced [5].

That's why the Coach-Ing model can support new generations of engineers in the approach, choice and entry the world of work. Coaching skills such as listening, clean and neutral language, creativity, suspension of judgment and mental openness are integrated with typical skills of engineering approach (diagnostic, analytic and design) to build up the Coach-Ing model.

The Coach-Ing model is not a sum of engineering skills and relational and behavioral coaching skills [6]. Research experience reveals that the integration of the two competence fields gives rise to a new additional field of expertise. Data references of the first research: **The 16 skills Coach-Ing – model parameters: the engineering skills (Table 1) and the coaching one (Table 2); in the following the 8 capabilities Coach-Ing (after the Tables).**

<i><b>SKILL</b></i>	<i><b>BEHAVIOR</b></i>
Initiative and Energy	Be proactive and effective
Work organization, time and resources	Planning in the perspective of optimization
Orientation to result and task	Define qualitative and quantitative performances
Self-Investment	Continuous Learning
Decision Making	be aware of own choices and related risks
Prospective Thinking	have an expanded temporaritized horizon
Proposals and projects	solving combining variables
Analysis and synthesis	Deep context reading and prioritizing
System Vision	Presidiate all variables in the game

**Table 1 – Engineering skills**

<i><b>SKILL</b></i>	<i><b>BEHAVIOR</b></i>
Adaptability	React effectively
Communicate	Be clear and effective
Build relations	Be open in the reference context
Social intelligence	Rule relational strategies
Intercultural sensivity	Understand new working approaches

Creativity and innovation	Change behaviural patterns and solve through new ideas
Assertiveness and influence	Open and cogent comparisons

**Table 2 – Coaching skills**

In the following, Coach-Ing capabilities and their associated skills/behaviors are listed:

Flexibility

Adaptability; Work, Time and Resources; Organization Intercultural Sensitivity.

Resilience

Assertivness and influence; Adaptability; Energy; Orientation to Result and Task Communication; Self-Investment.

Agile & Speedy Thinking

Creativity and Innovation; Prospective Thinking; Decision Making System Vision Analysis; Synthesis Social Intelligence.

High Achieving

Prospective Thinking; Proposals e Projects Orientation Result and Task Energy; Adaptability.

Confidence

Social intelligence; Build Relations; Intercultural sensibility; Assertiveness.

Courage

Proposals and Project; Result Orientation; Decision Making; Energy.

Optimism

Proposals and Project; Build Relations Courage; Adaptability; Assertiveness; Self-Investment; Inspiration.

Assertiveness

Proposal and Project; Energy; Communication; Prospective Thinking; Self-Investment.

On the base of the defined parameters, a long test cycle has been experimented on a population of engineers, both freelance and employees. It has been observed that, when coaching enters in the engineer's system of skills, the result is a rapid, effective and innovative responsiveness of individuals to the surrounding reality. These evidences have supported the utility of building Coach-Ing paths to provide new generations of engineers with more self-confidence, creativity and decision-making skills. Those skills are particularly important for the engineer as he isn't simply a consultant but a careful and curious analyst who uses and structures the content, knowledge and data of his client, playing his role in the process as actor and not just as "recipient" [7, 8, 9].

### 3. Field experimentation – Laboratory course methodology: "Entry the world of work: Tools, Scenarios and Strategy"

In order to further validate ongoing research and transfer to young engineers a new way of interact among them and towards the work environment, we have created an innovative university laboratory course at the Department of Engineering electrical and energy degree at the SAPIENZA University of Rome.

The course has been addressed to engineering students to introduce them into the knowledge of the possible working scenarios, to orientate and identify the most consistent personal strategies to present themselves effectively in different markets Area.

The Coach-Ing skills model has been used on two parallel levels, "the Self and the Professional" to generate a more aware approach to the work market and a greater capability for self-marketing.

The training workshop took place in a 3-month period and it offered lectures, team working conducted by the students. The educational-experiential path has been designed to let students learn how they can integrate coaching strategies and engineering techniques to be more successful in work fields. The students worked on the awareness of their attitudes and expendable skills in the professional world, with the support of "ad hoc" designed tools, such as tables and lists (Coach Ing-Data-Sheet), set of Discovering questions and Checking questionnaires. Furthermore, each student had the opportunity to practice and evaluate in team working, the possible alternatives for professional employment in the different work areas: Work-Site, Enterprise, Public Sector, Private practice, university education).

The output expected was the own individual strategy to approach the market counting on new personal and professional behaviors.

The course allowed to collect data on the increase of awareness and ownership of the observed Coach-Ing parameters in the participants. These parameters provided also the metric to evaluate the results of the final exam, as a validation of the entire training path. In an unconventional final exam, each student showed to the audience of professionals, coming from different work contexts, him/herself in the chosen working context, presenting his/her personal abilities and the skills developed during the training.

On that occasion, elements like style, communication, proposed strategy, the match of their proposal with market opportunities, have been observed by professional speakers, who were asked to also identify additional indicators to be included as part of reference parameters of the Coach-Ing model, for the most effective entry into the world of work.

An additional set of characteristics have been defined, as strategic competencies in the job interview. At the end of the training course, participants worked on these new skills during an extra training day dedicated to the follow-up named "communication in the job interview." The additional session was held with the professional coaches support, some of which also engineers, working together with the students on

the project of "construction of the communication and relational indicators pattern to face a job interview. "

Each coach had a team of student to support in identification of the most strategic behavior indicators in the job interview. By the end of the day, the students had a 1 to 1 session with the coach to self-assess on the new indicators and plan development plans to strengthen them. The results confirmed expectations about the utility of exposing cognitively and experimentally young engineers acquire behavioral skills designed specifically to complete their professional profile.

These findings lead to consider further and more structured career paths and professional development based on the acquisition of specific soft skills- The Coach-Ing skills have to be considered as part of standard university courses and incourses High Formations Programs and Postgraduate Masters.

Regarding the methodological approach, the experiential-learning system was developed in 5 steps using the Coach-Ing skills model:

1 Description of the Training Methodology, in terms of the use of coaching and engineering skills in the professional world. Students Self-assessment to evaluate their coaching and engineering skills.

2 Awareness of attitudes and professional interests of the students and matching with the proposed scenarios: Work-Site, Company, Public Administration, Free Profession, Training and Research.

3 Collaborative Approach, through team exercises and sharing of team working methods.

4 Theoretical Analysis and cognitive testing on the areas of Coach-Ing expertise: communication, relationship, self-awareness.

5 Self-marketing to build their best presentation to the labor market, underlining the coherence between working context and the individual specific skills and expertise.

Each student benefited of a collective training but at the same time specific and personalized, attentive to develop in each of them the awareness of expendable features and capabilities in the professional world. The large number of experiments conducted in the classroom gave the opportunity to test and discuss different work alternatives, opening minds to the opportunities of the marketplace, practicing new skills and behaviors [11].

As a final step of the course the students have faced an unconventional examination, a public seminar at the university where every student has submitted their personal project for entry the labor market, enhancing the results of their training path. The audience was composed by professionals referents from different working contexts proposed during the course.

The Laboratory has enabled and facilitated the match between business and universities, it contributed to animate a great amount of informal talks and discussions between students, professionals and representatives of leading national engineering companies. This experience offered the opportunity to organize the last phase of the path, the follow-

up during which the students have been supported by professional coaches to build and test specific behavioral indicators, useful to pass job interviews.

#### 4. Results and evidence of the Coach-Ing University Laboratory

Below are the evidence of the results achieved by the participants to the "Workshop for entry the world of work: Tools, Scenarios and Strategies".

The data confirm the positive learning curve of the Coach-Ing model skills, and their effectiveness in defining a strategic entry into employment project.

The results of the training program were collected through data sheet instruments (tools) as students self-assessment on Coach-Ing skills at the beginning of the training (IN) and at the end (OUT). In the table below, the results obtained on the students' population are averaged. The largest increase (+2 points) have occurred in the area of "Investment expertise in self" and "Relationship Building." Significant increase (+1 point), expressed by a large number of indicators, were recorded on all the other soft skills.

The self-perception of the intellectual-rational nature skills, remains stable, along with the skills that denote the realization energy. It means that the engineering typical skills are strong and consolidated in students.

SELF EVALUATION SKILLS COACHING E ING. (INTELLIGENCE,INNOVATION, INTELLECT)				
				
SKILL	SCALE FROM 1 TO 5	IN	OUT	
1 ADAPTABILITY	REACT EFFECTIVELY	1	2	
2 INITIATIVE AND ENERGY	BE PROACTIVE AND EFFECTIVE	3	3	
3 ORIENTATION TO RESULT AND TASK	DEFINE QUALITATIVE AND QUANTITATIVE PERFORM	3	4	
4 COMMUNICATION	BE CLEAR AND EFFECTIVE	2	3	
5 SELF-INVESTMENT	CONTINUOUS LEARNING	1	3	
6 BUILD RELATIONS	BE OPEN IN THE REFERENCE CONTEXT	1	3	
7 SOCIAL INTELLIGENCE	RULE RELATIONAL STRATEGIES	1	2	
8 INTERCULTURAL SENSITIVITY	UNDERSTAND NEW WORKING APPROACHES	2	3	
9 ASSERTIVNESS AND INFLUENCE	OPEN AND COGENT COMPARISONS	1	2	
10 DECISION MAKING	BE AWARE OF OWN CHOICES AND RELATED RISKS	3	3	
11 CREATIVITY AND INNOVATION	CHANGE BEHAVIOURAL PATTERNS AND SOLVE THROUGH NEW IDEAS	2	3	
12 PROSPECTIVE THINKING	HAVE AN EXPANDED TEMPORARILIZED HORIZON	3	3	
13 ANALYSIS AND SYNTHESIS	DEEP CONTEXT READING AND PRIORITIZING	3	4	
14 SYSTEM VISION	PRESIDATE ALL VARIABLES IN THE GAME	2	2	
15 PROPOSAL AND PROJECT	SOLVING COMBINING VARIABLES	2	3	
16 WORK ORGANISATION, TIME AND RESOURCES	PLANNING IN THE PERSPECTIVE OF OPTIMIZATION	1	2	
name				
surname				
e-mail				

Table 3

The IN and OUT self-assessment on the Coach-Ing parameters has been further validated through the use of a questionnaire. The questionnaire consisted of 30 multiple-choice questions

(four answers for each question). Each answer was representative of a behavior and relevant skill, from Table 1 and Table 2.

These specific skills were related to specific behaviors. While the Self-assessment has a scale rate from 1 to 5, the questionnaire has the reference values for the same capabilities through presenting the participant situations with multiple choice answers.

In the questionnaire the indicator of each skill is obtained as a weighted average of the number of times that same skill has been identified in the answers and the number of times that appears in the test.

Test answers lead to the indicators of individual skill. All skills have been suitably combined in groups associated to a more general skill, called Capability.

The indicator of each Capability Area is the average value of the individual skill indicators. This value, ranging from 1 to 5, reveals the degree of personal confidence with his Capability. The Coach-Ing skills, were then assessed by the committee who chaired the final event of the training path, which has expressed their evaluations on individual students, in the following table:

SELF EVALUATION SKILLS COACHING E ING. (INTELLIGENCE, INNOVATION, INTELLECT)		
		
SKILL	SCALE FROM 1 TO 5	OUT
1 ADAPTABILITY	REACT EFFECTIVELY	2
2 INITIATIVE AND ENERGY	BE PROACTIVE AND EFFECTIVE	3
3 ORIENTATION TO RESULT AND TASK	DEFINE QUALITATIVE AND QUANTITATIVE PERFORM	4
4 COMMUNICATION	BE CLEAR AND EFFECTIVE	2
5 SELF-INVESTMENT	CONTINUOUS LEARNING	3
6 BUILD RELATIONS	BE OPEN IN THE REFERENCE CONTEXT	3
7 SOCIAL INTELLIGENCE	RULE RELATIONAL STRATEGIES	2
8 INTERCULTURAL SENSITIVITY	UNDERSTAND NEW WORKING APPROACHES	3
9 ASSERTIVNESS AND INFLUENCE	OPEN AND COGENT COMPARISONS	2
10 DECISION MAKING	BE AWARE OF OWN CHOICES AND RELATED RISKS	3
11 CREATIVITY AND INNOVATION	CHANGE BEHAVIOURAL PATTERNS AND SOLVE THR	3
12 PROSPECTIVE THINKING	HAVE AN EXPANDED TEMPORARILIZED HORIZON	3
13 ANALYSIS AND SYNTHESIS	DEEP CONTEXT READING AND PRIORITIZING	3
14 SYSTEM VISION	PRESIDATE ALL VARIABLES IN THE GAME	2
15 PROPOSAL AND PROJECT	SOLVING COMBINING VARIABLES	3
16 WORK ORGANISATION, TIME AND RESOURCES	PLANNING IN THE PERSPECTIVE OF OPTIMIZATION	2
name		
surname		
e-mail		

Table 4

In conclusion, the Observer Committee confirmed the self-assessment of students with respect to the level of skills at the end of the training program. In additions the Committee provided some more observations useful to plan the following follow-up day. In particular, the skills of the Communication and the Analysis and Summary were evaluated weaker than the evidence from students self-assessment.

Based on these observations, some aspects of communication and the ability to synthesize self-presentation during the job interviews have been the core learning during the follow-up day.

The following table shows the list of additional skills and indicators the students have been working on during the follow-up day with the support of professional coaches, to

prepare their presentation at the Job Interview.

The final results of this work has been evaluated by students self-assessment and a final evaluation by the Coaches who worked with the students. In self-perception, we find an increase of 2 points in the organization of the contents expressed during the Presentation, in the use of pauses and in assertiveness, an increase of 1 point in all the skills indicating a stronger assertiveness, incisiveness and power of conviction in the presentations. The ability to synthesis, self-confidence and tone of voice remain unaltered.

Coach ING - SELF EVALUATION SKILLS COMMUNICATION IN THE INTERVIEW			
	SKILLS	IN	OUT
1	EXPRESS CONTENT	3	5
2	CLARITY	3	4
3	PRESENCE	3	4
4	SILENCE	0	1
5	SYNTHESIS	2	3
6	CONFIDENCE	3	3
7	INFLUENCE	3	4
8	EMOTIONALISM	1	1
9	EFFECTIVENESS	3	4
10	STONE OF VOICE	4	5
11	BREAK TIME	1	3
12	CAUTION	2	3
13	ASSERTIVENESS	0	2
14			
15			
16			
	name, surname		
	E-MAIL		

**Table 5**

In their evaluations the Coaches confirmed the values expressed by the participants at the end of the day and a further increase in the score assigned to the tone of the voice and the Synthesis Capability. This different result is probably due to the difficulty of perceiving the characteristics and the variations of own expressiveness, unless listening to a recording. On average, engineering students think they are quite competent regardless of specific training. It is therefore useful the feedback of the Coaches who have underlined the further increase of Synthesis skill enforced by the work done during the training to acquire an ever greater cleanness of the language.

Coach ING - SELF EVALUATION SKILLS COMMUNICATION IN THE INTERVIEW		
	SKILLS	OUT
1	EXPRESS CONTENT	5
2	CLARITY	4
3	PRESENCE	4
4	SILENCE	1
5	SYNTHESIS	3
6	CONFIDENCE	3
7	INFLUENCE	4
8	EMOTIONALISM	1
9	EFFECTIVENESS	4
10	STONE OF VOICE	5
11	BREAK TIME	3
12	CAUTION	3
13	ASSERTIVENESS	2
14		
15		
16		
	name, surname	
	E-MAIL	

**Table 6**

The results emerging from the analysis and study phases have definitively confirmed the expectations regarding the usefulness and the opportunity to offer specific training paths to the Engineering students to enhance their professional growth and development. In particular, it is been noticed that the use of the Coach-Ing methodology has a transformative impact on the group and on the individual and it can be used in several formative slots along all the standard university courses. Furthermore, the possibility to develop and propose specific training Coach-Ing programs in Higher Education and Masters courses seems to be increasingly challenging.

**5. Final considerations, conclusions, expected developments of the project**

Thanks to the training on Coach Ing skills, the use of validation paths and all the tools provided to the participants, they increased their awareness level of the use of communication and relationship skills, their confidence in choice, analysis and reading of the context. In conclusion what students gained as final result of the Coach-Ing training path is:

- a personal and effective communication style
- a good level of contextual reading and awareness of working scenarios and strategies
- self-assessment on skills that are traditionally unfamiliar to Engineering students
- ability to face with professionals from different generations and extractions, bringing their own work proposal
- ability to build a collaborative model that stimulates comparison, benchmarking and enhancement of individual skills and attitudes.

In addition to the positive feedback from the participants regarding their personal growth and greater awareness of themselves and others, we have collected opinions and testimonies from the professionals involved in the project, belonging both to the world of Engineering and Coaching.

These evidences encourage the further planning of training interventions targeted and integrated with the traditional study paths, which can permanently permeate the technical and engineering culture. Growing professionals who are aware of the importance to use and balance technical and relational skills, represents the current challenge to prepare young engineers to the future.

In the next in-depth studies planned by the university for the outgoing generations we propose new models of market development and analysis supported by specific skills in social innovation and web communication, in order to enrich not only the Coach-ing model but also and above all the patrimony of every single professional who today is required to update and constantly enrich his curriculum vitae. For these reasons, it is planned a Higher Education Course which will take place in the academic year 2018-2109 at SAPIENZA University of Rome.

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