Soft Skills & Metacognition as Inclusion Amplifiers in the 21st Century

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Abstract—In the present paper we investigate soft skills in the light of metacognition. We seek the essential soft skills in the 21st century including green skills and look into their cognitive and metacognitive background. Enlightening the soft skills' dependence on metacognition, we conclude on a metacognition-based approach and suggest useful tools and strategies. The metacognitive approach of soft skills can be applied in a variety of educational contexts as a training paradigm to accelerate the inclusion and success of students, employees and citizens, especially those belonging in vulnerable groups like persons with disabilities.

Keywords—Soft-skills, green skills, mental abilities, executive functions, metacognition, intelligence, inclusion, employability, education

1 Introduction

The megatrends of the Fourth Industrial Revolution are ready to shape our future. The technological revolution, the cultural changes, demographic shifts, migration and climate change bring major challenges and opportunities in all areas of human activity, especially in regards with the necessary skills so as to be inclusive at school, at work, in everyday life [1].

Researches reveal that soft skills are a prerequisite in the 21st century when most people do not possess [2,3]. There is not a single term or definition of soft skills and this is an additional problem in the literature. In general, soft skills refer to a wide range of intra- and inter-personal (socio-emotional) skills that guarantee personal, academic and professional success [4]. Besides lacking a clear definition and with many researchers trying to classify them [2], there is a lot of ambiguity about what are the "real" soft skills, what is their real nature.

Metacognition refers to a set of self-regulatory functions and skills that enable the individual to respond successfully in all areas of life. Metacognitive processes include, among others, self-observation, self-regulation, reflection, self-assessment, and the ability to modify and adapt cognitive and emotional functions [5]. According to the Organization for Economic Co-operation and Development, next to socio-

emotional skills, metacognitive skills are becoming most essential in the 21st century [6].

The purpose of this paper is to study soft skills in the light of metacognition. We seek the soft skills that are considered necessary, examine them using the models of metacognition developed by Drigas al. [5, 7] and recommend strategies and tools for the development of soft skills that can be used at school, academic and individual level.

2 Soft Skills Needed for Inclusion In The 21st Century

According to the Organization for Economic Co-operation and Development [6], three types of skills are necessary for the future:

1. Cognitive and meta-cognitive skills include critical thinking, creative thinking, learning-to-learn and self-regulation.
2. Social and emotional skills involve empathy, self-efficacy, responsibility and collaboration.
3. Practical and physical skills, which include using new information and communication technology devices.

The World Economic Forum reports [8] that the most essential skills one must develop are: analytical thinking and innovation, active learning and learning strategies, complex problem-solving, critical thinking and analysis, creativity, originality and initiative, leadership and social influence, resilience and stress management, emotional intelligence, reasoning, problem-solving, systems analysis and evaluation, persuasion and negotiation.

Mekala et al. [9] examined students' perception of skills required in the 21st century. An online survey with self-rating questionnaire has been administered among 111 final year college students using random sampling technique. Specifically, they included skills such as creativity and innovation, critical thinking and problem solving, communication and collaboration, flexibility and adaptability, initiative and self-direction, productivity and accountability, social and cross-cultural skills, leadership and responsibility skills. The study has concluded that students lack especially soft skills such as communication and collaboration.

Majid et al. [3] investigated students' perception as to the importance of soft skills in their education and employment. According to a questionnaire, the top five important soft skills identified by 188 undergraduate business management students were: teamwork and collaboration, decision-making, problem-solving, time management and critical thinking. It is noteworthy that to a large extent students failed to recognize the importance of soft skills in terms of academic achievement.

Employers want qualified graduates who combine both soft skills and technical skills. Mahasneh et al. [2] analyzed 32 literature documents that address soft skill classification/frameworks across a variety of disciplines. A list of 120 soft skills was classified in 12 clusters: Social intelligence, communication, workplace thinking, self-intelligence, conflict resolution and negotiation, planning and organizing, teamwork

and collaboration, workplace diversity, workplace ethics, stress management, workplace productivity, workplace professionalism.

Qadir et al. [10], taking into account various taxonomies, described the essential competencies that future electrical and computer engineers must acquire. In addition to technical skills, they include the *metacognitive skills*, *the breadth skills and the inter/intrapersonal skills*. The metacognitive skills involve four important concepts, namely *growth mindset, transfer skills, critical thinking* and *lifelong learning*. The *breadth skills* refer to the h*olistic multidisciplinary learning, synthetic and integrative thinking, design thinking, systems thinking* and *visualization skills*. Finally, they underline the *inter/intra-personal skills* such as *communication, teamwork, collaboration, global competence, creativity and innovation, entrepreneurship* and *focus on wisdom* and *ethics*.

As the literature shows, the authors focus more on interpersonal and intrapersonal skills. However, one of the greatest dangers that humanity faces and will face in the current century is climate change. Climate change drives labor demand and skills towards a sustainable development. The various organizations point out that the foremost skills in all sectors and at all levels will be the *green skills*. According to this, people should at least adopt responsible and eco-friendly behaviors so as to cause minimal harm to the environment [11, 12].

3 Metacognition, The Foundation of Soft Skills: Building The "Real" Skills

In this section, we will utilize the models of metacognition developed by Drigas et al. [5, 7] to shed light on the relationship between soft skills and metacognition. Metacognitive development depends on eight pillars. In short, it requires one's deep theoretical and practical knowledge in combination with the abilities of self-observation, self-regulation, adaptation, recognition, discrimination and remembrance [5]. Mindfulness constitutes simultaneously a counterpart of metacognition and an umbrella term showing people's awareness over the ways metacognition works [7]. According to these models, soft skills development depends on the following nine metacognitive pillars:

3.1 The cognitive and metacognitive background of soft skills

What is the real nature of soft skills? What is their cognitive and metacognitive background? Usually, we believe that soft skills are non-cognitive. Actually, they depend on fundamental mental abilities such as the following [5, 13, 14].

- Attention
- Concentration
- Memory
- Perception
- Recognition of hidden patterns

- Association
- Processing speed
- Speed reaction
- Language
- Coordination
- Prediction
- Action

Soft skills like critical thinking, creativity, time management, planning, reasoning, following instructions, problem solving depend mostly on attention and working memory. Specifically, attention and working memory help people to concentrate, to hold their goals on mind, to associate, to recognize what is relevant, to see relations and connections between ideas seemingly unrelated, to discern elements from an integrated whole and recombine in new ways. Working memory influence the processing speed, the pace at which people understand and react to the information they receive [13]. Critical thinking, for instance, is dependent upon attention, perception and memory. Critical thinkers should be able to attend, manipulate data in the working memory, organize information in the long-term memory, recall and transform existing schemata (representations of knowledge) into more abstract [14].

In fact, the proper functioning of soft skills relies on the executive functions, the basic "control" system that supervises higher mental abilities like attention and memory responsible for skill development and self-regulated behavior. Executive functions empower the individual's ability to control attention, impulses, emotions and behaviors. A controlled cognitive system guarantees that one can stay focused on tasks despite distractions, resist unwanted thoughts, temptations and impulsivity and inappropriate behavior [13].

Metacognition is a higher order "control" system capable of gaining awareness of its own processes. Humans stand out because they are able to become aware of their own cognitive functions, to monitor, regulate and adapt them appropriately in order to achieve even higher levels of self-development. Thus, metacognition constitutes the key factor that allows people to manage their cognitive functions in ways that make them creative, cooperative, critical, resilient, decisive, and flexible [5]. Metacognition, for instance, helps people to be creative even though they are not especially creative.

3.2 Self-awareness

People that aspire to be better learners, communicators, decision makers and team-players should use the above knowledge as means of self-assessment so as to identify their strengths and weaknesses and then try to find the appropriate strategies that compensate for these weaknesses. McConnell et al. [15] reviewed the nonacademic behaviors of good students and successful employees with mild to moderate disabilities. Objective self-assessment was ranked high in the variables for success. They were aware of their "Achilles' heel", the barriers they had to break and unwilling to let them define their life. They adopted strategies that helped them advance in life.

Specifically, they tried to make the appropriate choices, to set high but realistic goals and be flexible enough to achieve them.

Individuals should know which factors influence the development of soft skills either positively or negatively and apply this knowledge appropriately in real life. Positivity and calmness, for instance, boost motivation and self-esteem. Multi-tasking, clutter and procrastination have a negative impact on time-management. The ability to communicate slows down due to stress and emotional barriers like anger, low self-esteem, taboos, expectations, prejudices, lack of attention or motivation and physical disabilities [16]. Even lack of sleep or physical exercise may result in inattention, forgetfulness, poorer reasoning, creativity and problem solving [13].

3.3 (Self)-observation

Self-observation refers to the internal attention, the ability to watch and to perceive in real time the cognitive states and operations [5]. During this process, one observes himself as a subject of attention that thinks, feels and acts [17]. Creative problem-solving demands of individuals to observe their own actions, their strategies, the processes of selecting more appropriate strategies, the regulation processes, and the progress toward a goal. They should be on the alert for things going wrong so as to step up to correct them or alter their plans [18]. Analytical skills, a prerequisite for solving problems, presuppose constant observation and evaluation [10, 19]. Self-observation is of the essence since it facilitates social relationships so that one can live harmoniously in social groups. Specifically, it enhances one's ability to predict behaviors, by learning to observe, recognize and associate one's own behavior with others' reactions [17].

3.4 Self-regulation

Self-regulation is the ability to consciously change, regulate and fine tune via decisions the cognitive abilities themselves as well as the mental and emotional states [5]. Self-regulation allows people to change or inhibit thoughts, emotions, impulses, behaviors so as to feel a sense of accomplishment. Self-regulation helps people to be focused at work, as in resisting temptations (i.e., browsing the internet) [17]. The ability to self-regulate depends on the executive functions and in particular attention which brings one in a state of awareness where one consciously controls conflicts on a cognitive and socio-emotional level [13, 20]. Self-observation and self-control are where the intrapersonal as well as the interpersonal skills find common ground [5]. Failures in self-regulation can lead to anti-social behaviors [17]. Conflict resolution, for instance, depends on the ability to regulate any negative emotion showing emotional maturity, in other words to gain self-control [19]. Individuals rectify situations and re-establish good relations within a group. Self-regulation functions proactively like refrain from prejudice and in general making a good impression. In some cases, it helps with stereotypes, overcoming one's fear of conforming to another's negative beliefs [17].

3.5 Adaptation

Adaptation as a metacognitive ability allows for the conscious change of the operational status of one's cognitive abilities, becoming more flexible at work, meeting the various demands of social situations, being more productive, successful and happy. Adaptation is impossible without self-monitoring and self-regulation [5]. When the above condition takes place people can change perspective, namely think out of the box or "see" others' perspectives. They are open to feedback, acknowledge and accept their mistakes, make alternative plans, prioritize [13]. Can one solve problems without the above metacognitive skills? Adaptation boosts entrepreneurship since it makes people flexible enough to take advantage of unexpected opportunities, to adapt as the rules change. When one finds new uses in things it is not only creative and innovative but also flexible. Even verbal fluency is a form of flexibility. Finally, adaptation enables people to overcome inertial tendencies and change bad habits [13], for instance adopting eco-friendly behaviors.

3.6 Recognition

Recognition means perceiving all aspects of situations internal and external, "seeing" the totality, thinking holistically so as to achieve goals, solve various problems or be ready to jump at a chance [5]. Recognition presupposes that one learns from everything, makes good use of all available sources of human learning (i.e., cognitive, emotional, psychomotor). In a more practical view, one becomes "a jack of all trades", a polymath, a person who knows the rules about learning new skills [10]. In this age of uncertainty, the metacognitive ability of Recognition helps people to be inclusive, to overcome unemployment, to survive; It enables one to transfer and apply knowledge, recognize the right questions, causes, relations, consequences, conceptual frameworks. On a higher level of creative thinking, one conceives new ideas [10], perceives the world in new ways, identifies hidden patterns, and makes connections between seemingly unrelated phenomena. Entrepreneurial thinking skills depend on the ability to recognize new and real opportunities [19].

3.7 Discrimination

Discrimination means to filter thoughts, emotions and situations; make appropriate choices that are more helpful, positive, and supportive for reaching targets, success fulfillment and development [5]. This metacognitive ability helps to choose the right thoughts and emotions, the right goals, the right strategies, the right jobs, the right social networks maximizing strengths and minimizing weaknesses [15]. In a world inundated with data and information, critical thinking requires to filter information, so as to identify the root cause of a problem, recognize biases and logical fallacies [10]. Decision making is the ability to make appropriate choices concentrating on what is most important or useful [19]. Even time management depends on people's ability prioritize between tasks [16].

3.8 Mnemosyne

Mnemosyne means memory in Greek. It is the state of metacognitive awareness in which people are independent at home, at work, at school; Mnemosyne allows people to apply the rules of self-achievement on a case-by-case basis, to be aware of their mental tools making good use of them [5]. Mnemosyne makes people self-motivated, since they don't need close supervision but they are committed to their goals, always seeking opportunities. They are generally positive, self-confident, resilient and adaptable to change [16]. Mnemosyne is about cultivating a growth mindset. A person with a growth mindset focuses on goals, hard work and effort, treating failure as a learning opportunity. In addition, it includes appreciation of diversity and respect of the different cultures [10].

3.9 Mindfulness

Mindfulness is the integration and application all of the above-mentioned metacognitive abilities in practice. Mindfulness exists when attention is turned inward to operate upon itself, when attention obtains stability, control, when memory becomes flexible. It is present every time one applies self-observation and self-regulation of a psychological content, self-talk, emotions, stress and impulses. As regards the soft skills, mindfulness translates to effective communication, less conflict, better working relationships, increased creativity and innovation. It also allows active listening with increased awareness, less judgment, more acceptance of others. It promotes self-motivation, leadership, trust, empathy and compassion. Mindfulness increases team cohesion and allows team-group members to develop and use shared structures of knowledge leading to the development of high-performance work teams. [5,7, 21].

4 Metacognitive Strategies to Support Soft Skills Acquisition

School-based programs like *Social-Emotional Learning* (SEL) could help students achieve greater social, emotional, and academic success. SEL programs focus on five key areas: *self-awareness, social awareness, self-management, relationship skills and responsible decision-making*. Specifically, such programs guide students to recognize strengths and weaknesses, to cultivate self-esteem. Students also learn to show empathy, manage their emotions, negotiate, assess risks and make good decisions. SEL programs not only boost soft skills but have become an umbrella that encompasses various different educational programs that focus on *violence prevention, anti-bullying, drug prevention, and school discipline* [22].

Another good example in school intervention programs is this attempt at helping people with disabilities to develop job-related social skills. People with disabilities face various barriers to employment. One reason is because of poor job-related social skills. Thus, many people with disabilities are deprived of the right to be included in the society and live independently. *Programs that train soft and employment skills* help people with autism (in particular high-functioning autistic cases) to improve

social skills, self-confidence, empathy, self-efficacy, and psychological wellness so as to be engaged in social and vocational activities [23].

Research has shown promise as to the effectiveness of *mindfulness-based programs* in schools, by improving control of attention and executive functioning, bolstering social-emotional resiliencies both helping teachers and students manage school-related stressors. These programs offer various exercises and techniques like *breathing, relaxation, tactile perceptual activities, body scan, guided imagery, mindful listening*. Many schools have begun to integrate these programs into their curricula [24].

Other exercises supporting the development of soft skills in the school-setting are [25]:

- Projects in which students communicate with peers outside their classroom
- Role-play scenarios that help students to express ideas and concepts
- Student-made documentaries or videos about environmental issues
- Rotating classroom responsibilities
- Energy conservation programs exploring how school could be more energy sufficient
- Analyzing issues from multiple perspectives
- Debating about ethical issues
- Designing their own business or company website
- Doing research (i.e., on new technologies)
- Collaborating on projects
- Reflecting on their own work and progress verbally, through representations or graphs
- Building their own games

Technological tools can be used to teach, learn or enhance soft skills at home, at school or at work. Some useful tools are [26-28]:

- Massive open online courses (MOOCS)
- Open Educational Resources
- Social Media
- Online Games
- Computer Games
- Web 2.0 tools
- 3D printers
- Mini robots (e.g., Bee Bots)
- Virtual and augmented reality (VR/AR)
- Cloud-based platforms
- Websites and applications

Massive open online courses help self-directed learning, creativity, communication and flexibility [27]. The use of *social media* allows people to share and exchange ideas, connect and build relationships, *Social media apps* also boost communication with people outside the classroom or campus. *Online videos* and *digital games* may

enhance critical thinking skills. People learn to make quick and accurate decisions in such games. *3D printers* are useful tools in improving problem-solving skills, creativity and innovation. *Apps* and *cloud-based platforms* improve students' time management skills whereby they learn to keep track of all their notes, documents and images in one central data storage, making it easier to find everything they need for an assignment. This requires proper data management to ease the process of retrieving information [26]. *VR/AR technology* raises the level of engagement, promotes self-learning and multi-sensory learning. It also improves attention, memory, visuo-spatial abilities. Finally, it helps students to collaborate with self-confidence and be creative [28].

5 Discussion and Conclusion

According to Gardner, there are eight distinct intelligences: linguistic, logical-mathematical, musical, bodily kinaesthetic, visual-spatial, interpersonal, intrapersonal and naturalistic intelligence. Interpersonal, intrapersonal and naturalistic seem to be the most important intelligences that underlie the soft skills needed in the 21st era. Interpersonal intelligence turns one's attention outward, towards behaviors, feelings and motivations of others. Intrapersonal intelligence turns attention inward, allowing one to recognize and discriminate between basic or more complex feelings. Naturalistic intelligence is about how sensitive individuals are about environmental issues [29-30]. According to Drigas et al. [31], Gardner's intelligences are not one-dimensional, but each one is structured on 8 layers. Each layer represents a higher state of knowledge, intelligence and consciousness. Metacognition plays decisive role in the process of ascending these layers, of "building" the knowledge, of developing the intelligence. Thus, it is obvious, that soft skills development is impossible without metacognition.

The present paper examined the relationship between soft skills and metacognition. Initially, it was found that soft skills have a rich cognitive background, led by attention, working memory and other executive functions. With regard to metacognition, the investigation showed that soft skills are entirely dependent on the development of metacognitive skills.

According to the metacognitive approach, the development of soft skills requires:

1. Systematic education on soft skills theory including cognitive and metacognitive theories.
2. Reality-based training in order to achieve self-awareness of strengths and weaknesses through experience, identify new areas of development and employ appropriate strategies to compensate for weaknesses.
3. Training on (self)-observation via various techniques that strengthen attentional control, the foundation of soft skills development.
4. Training on self-regulation in order to develop a set of self-regulatory strategies for overcoming the everyday barriers towards achievement.

5. Training on adaptability and flexibility in various domains (cognitive, emotional, and behavioral) so as to be better prepared to adjust to uncertainty, to rapid change.
6. Training on Recognition, the metacognitive ability to think "out of the box", identify and grasp opportunities so as to be inclusive.
7. Training on Discrimination, the metacognitive ability to filter, to be critical in order to make the right decisions.
8. Cultivation of a growth mindset (mnemosyne) which enables you to focus on goals, hard work and effort, treating failure as a learning opportunity.
9. Cultivation of mindfulness, an umbrella term that encompasses all metacognitive abilities and makes you totally inclusive. Mindfulness makes you a team player, a peaceful leader, the future-ready mind.

We conclude that soft skills are fully trainable. Only when individuals train their metacognitive skills can they develop the appropriate cognitive and socio-emotional skills that will make them inclusive into the academic, working and social environment.

It is essential to recognize the challenges and the opportunities of our century in order to pave the way for a more inclusive society while offering financial security, equal opportunities and social justice for all including those with disabilities [1].

The metacognitive approach of soft skills development could be exploited as a training paradigm both on an individual and collective level. On an individual level, it could be utilized by students, parents, employees and employers. On a collective level, if large organizations utilize this training paradigm could very well design new educational programs for students, employees and citizens. Not in the least, it could provide substance for the development of new technological tools.

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