

## **How to Transversely Develop Ability Emotional Intelligence Ability through School Subjects? A Theoretical Proposal**

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### **Abstract**

Since emotional intelligence (EI) was developed in 1990, the field of Education took advantage of the possibilities of EI. Indeed, EI-specific programs proliferated and developed as socio-emotional learning programs (SEL). However, there is an alternative to realize non-specifically and longer and viability way for improving the implicit abilities of EI (AEI). The article claims to work a theoretical proposal to develop the AEI in compulsory education through the subjects. This proposal is based on the Cattell-Horn-Carroll theory of cognitive abilities (CHC). CHC abilities are stimulated by most of the mandatory subjects of both Primary and Secondary Schools. The second stratum of CHC model is composed of similar cognitive abilities as 1997-Ability Emotional Intelligence Model (perception, using, understanding, and managing emotions), which is different from trait EI approaches - that consider EI has personality traits as well. It has pointed out that the capacities of the CHC-model second stratum are connected to the capabilities of AEI. Therefore, any educational activity that optimizes perception, understanding, attentional control or planning is affecting the development of AEI. Promoting AEI involves hot information processing. It is convenient to use transversely hot information processing - this means that this information has special meaning for the people. Connecting hot information to mandatory subjects teaching would develop the abilities of EI. Both Sciences and Natural Sciences pedagogic devices can improve emotional perception. However, Social Sciences and Humanities foster both emotional understanding and knowledge. Finally, the different contingencies that occur in school life scenarios are suitable for training of emotional regulation.

*Keywords:* ability emotional intelligence, emotional education, Cattell-Horn-Carroll theory of cognitive abilities, socio-emotional learning

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### **What is Ability Emotional Intelligence? An Update**

Let us try to solve the next emotional statement: Which emotional state may result in a constant worry? Think about it for a while and decide on one from the next list of emotions: disgust, anxiety, sadness, joy or anger. Based on the traditional

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emotional knowledge, the only possible answer is anxiety (Cisler, Olatunji, Feldner, & Forsyth, 2010). Anxiety is a secondary emotional state that affects a person's perception of existential life, whose central cognitive process is to be concerned (Lazarus & Lazarus, 1996). Another emotional intelligence question, perhaps even more challenging than the first, is this: How can people effectively regulate their anxiety state? The relationship between cognitive performance and anxiety arousal follows Yerkes-Dodson Law (1908) (see Figure 1), i.e., medium levels of anxiety involve better cognitive performance than both lower and higher levels of anxiety (Oatley & Johnson-Laird, 2014). Hence, people who can regulate their anxiety states to medium levels are using their ability emotional intelligence (AEI) (Mestre, MacCann, Guil, & Roberts, 2016). This type of emotional decision-making implies an intelligent act (Salovey, Hsee, & Mayer, 1993) because people use the information set on their emotional processes to help them make more effective decisions, especially when making decisions using the controlled cognitive system instead of the automatic one (Kahneman, 2011).

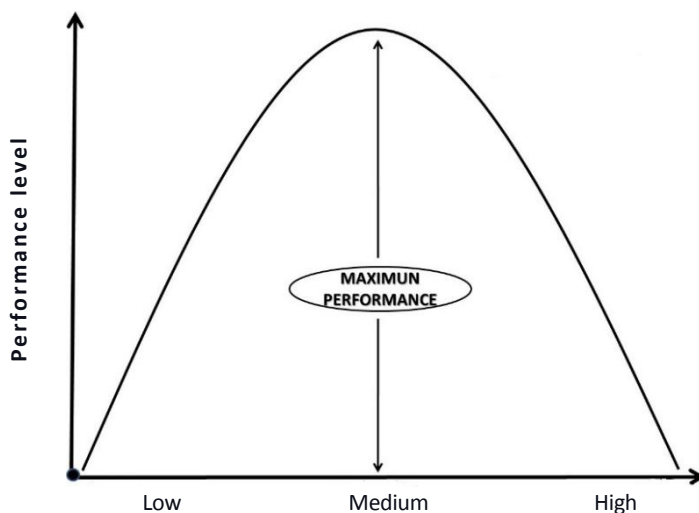


Figure 1. Yerkes-Dodson Law (1908).

Like any other intelligence, ability emotional intelligence (AEI) has to be addressed to solve problems related to social functioning (Guil et al., 2018), especially when the information we use come from emotions (Lopes et al., 2004).

In 1990, Salovey and Mayer proposed the existence of this intelligence based on research in different areas, such as cognition, emotion, intelligence or psychotherapy, suggesting that some people might be more intelligent with emotions than others (Salovey & Mayer, 1990). Subsequently, they pointed out what cognitive abilities are in their AEI's theoretical framework, following a hierarchical model, from bottom to the top, described as perceiving, using, understanding, and managing emotions in oneself and others (Mayer & Salovey, 1997). This 1997-AEI model has

a hierarchical development as well, hence, the lowest level, *perception*, is going to develop earlier than the others (Mayer & Salovey, 1997).

However, some authors have defended that the second ability, *using emotions*, should be integrated within the other three (see, for example, Mestre et al., 2016; Mikolajczak, 2009). Thus, ability emotional intelligence (AEI) would have three main abilities: perception and expression of emotions, understanding and knowledge of emotions, and emotional regulation (Hughes & Evans, 2016).

### **Seven Principles for the Last Update about Ability Emotional Intelligence**

With the 25<sup>th</sup> anniversary of the ability emotional intelligence (AEI), Mayer, Caruso, and Salovey (2016) have established seven principles that AEI should follow: The *first* is that the AEI is a *mental capacity*. This is an obvious principle if we bear in mind that the term AEI carries the noun *intelligence* and the adjective *emotional*. Some EI approaches, such as trait emotional intelligence (TEI), argue that the term includes certain personality traits (see Petrides et al., 2016). However, the AEI approach tries to keep the EI as a new theoretical construct of intelligence, albeit in a broader sense than intelligence's psychometric tradition (Iliescu, Ilie, Ispas, & Ion, 2013; MacCann, 2010; Mayer, Roberts, & Barsade, 2008). If the intelligence is the capacity to carry out abstract reasoning, to understand meanings, to know how to distinguish between similarities and differences between two concepts, to generalize situations from facts, and to understand when to apply exceptions, then this system of mental capacities (Detterman, 1982) can also be applied to emotions to identify how people are capable of accurately perceiving and expressing emotions, how people use emotions to facilitate their thinking, how they understand emotional processes and their meanings and to regulate and manage their emotions for a better social and personal functioning (Mayer et al., 2016; Mestre et al., 2016).

The *second* principle is that AEI is better measured as a capacity than as a trait. Like any intelligence assessment instrument, AEI should be measured by cognitive tasks (Kong, 2014). MacCann and colleagues have pointed out that it is difficult to justify why AEI could be measured differently from any other type of intelligence, especially because AEI is structured in a similar way to the current definitions of intelligence based on the CHC mental-capacity model - Carroll, Horn and Cattell (MacCann, Joseph, Newman, & Roberts, 2014; MacCann & Roberts, 2008; Mestre et al., 2016). Furthermore, it seems that people are imprecise in estimating their own intelligence and EI capabilities (Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006), so how can researchers be sure of these AEI self-estimations based on self-reports? (Mestre & Guil, 2006). Does it make sense to ask people how emotional intelligent are they? Probably just in case we are interested in knowing their own perception of their AEI, which may be also useful to know (Mestre et al., 2016).

The *third* principle is that solving problems intelligently does not necessarily correspond to intelligent behaviour. For example, a gifted student is likely to achieve a good academic performance, but this cannot be assured because it has been broadly

reported that gifted students may have a below-average academic achievement for different reasons (Betts & Neihart, 1988; Callahan & Hertberg-Davis, 2013; Clinkenbeard, 2012; Guignard, Jacquet, & Lubart, 2012; Whitmore, 1980). Furthermore, AEI should be no different from other intelligence (Duckworth, Quinn, & Tsukayama, 2012). For example, some male adolescents with high EI are socially undervalued by their peers and teachers, yet they demonstrated a good capacity for academic achievement and a certain level of educational resilience (Lopes, Mestre, Guil, Kramenitzer, & Salovey, 2012; Mestre, Guil, Lopes, Salovey, & Gil-Olarte, 2006). Curiously, this male pattern of high AEI is maintained with male high-school students who prefer using their emotional abilities for academic achievement rather than for social functioning. Conversely, female high-school students prefer using their AEI for keeping good social functioning and academic achievements (Mestre et al., 2006). In other words, the theoretically foreseeable prediction of good social acceptance is not always fulfilled in people with high EI, at least with a high percentage of secondary-school males with good performance in cognitive task test such as the MSCEIT (*Mayer - Salovey - Caruso Emotional Intelligence Test*; Mayer, Salovey, Caruso, & Sitarenios, 2003).

Besides, let us not forget that the term *intelligent* is an adjective, while *intelligence* is a noun. Linguistic connotations are important not to get lost in terminological vagueness. Emotionally intelligent behaviour is more related to the TEI approaches and personality construct than intelligence (Mayer et al., 2016), although significant correlations (low and very low) were found between intelligence and personality (Joseph & Newman, 2010).

The following two principles relate to how EI should be measured. *Fourth*, the *content* of an AEI test to be applied should cover the area of the problem to be solved. As a general rule, the intelligence tests have many items and are longer in duration, approximately 45 minutes in adults. An AEI test needs to cover a broad sphere of capabilities (perceiving, expressing, understanding, and managing emotions) in both personal and social functioning (Matthews, Zeidner, & Roberts, 2012; Mayer et al., 2008). Testing intelligence requires to measure the whole framework and not just a few parameters of it (Nafukho, 2010), and, in the future AEI research, it is, therefore, necessary to assess AEI using different tests (by every single branch - perceiving, using, understanding, and managing) rather than a single and broader AEI measure, due to the construct validity issues (Lim, Lee, Pinkham, Lam, & Lee, 2019).

How to assess AEI at different ages is related to construct validity issues. Both social and cognitive development is affected by brain maturity (Izard et al., 2008; Vogel-Walcutt, Schatschneider, & Bowers, 2011; Vrtička, Bondolfi, Sander, & Vuilleumier, 2012), which means that AEI is going to increase with age (Fariselli, Ghini, & Freedman, 2008). Hence, the level of difficulty for an AEI test should rise with age (Van den Broeck, Hofmans, Cooremans, & Staels, 2014). Among other reasons, it is not an easy task to build an AEI test for children because their AEI is still incipient; and also a good level of verbal understanding (a crystallized intelligence) (Alegre, 2010) is necessary, although non-verbal abilities are important

for the development of AEI as well (Albanese, De Stasio, Di Chiacchio, Fiorilli, & Pons, 2010).

Besides, to be able to understand social emotions, it is necessary to foster a cognitive development improvement (Allen et al., 2015; Elfenbein, Barsade, & Eisenkraft, 2008; Fiori & Vasely-Maillerfer, 2018). For this reason, many of the EI test for children just include emotional perception and expression tasks (Mestre, Guil, Martinez-Cabañas, Larran, & de la Torre, 2011). An example of the complexity of social emotions for children is the development of the theory of mind, which begins close to four years of age (Lecce, Bianco, Devine, Hughes, & Banerjee, 2014). Therefore, for instance, to test understanding and emotion management of children, it would imply a higher emotional knowledge to understand what role has the envy in a social comparison situation. At earlier stages of people's life, testing AEI should be centred on perceiving and expressing emotions (Mayer & Salovey, 1997).

The *fifth* principle, quite related to the previous one, is that these *EI-performance tests represent a score* of how people's AEI are, and their differences in the score, in turn, reflect their mental ability to solve emotional content problems. Therefore, if the test includes items that poorly reflect the content of the EI, then these tests do not correctly represent what we want to measure and we could make erroneous forecasts (Mayer et al., 2016). The elusiveness of testing AEI has been reported several times (i.e., Sharma, Deller, Biswal, & Mandal, 2009).

The *sixth* principle is that AEI is a *broad intelligence*, what means that AEI is better framed in those perspectives that have a molar vision of intelligence rather than a molecular one - such as the factorial perspective of intelligence (Mayer, Salovey, Caruso, & Sitarenios, 2001). Therefore, EI is theoretically better framed in the adaptive perspective of intelligence (Mestre, 2003). The adaptive perspective of intelligence is represented by authors such as Gardner, Sternberg or earlier by Vygotsky or Piaget (Plucker & Esping, 2014). This perspective argues that intelligence moves between broad and narrow capabilities. Specifically, the most influential intelligence model today is the Cattell-Horn-Carroll (CHC) (Schneider & McGrew, 2012), which is also known as the three-stratum intelligence model (Schneider & Newman, 2015). The CHC model has been matched with the AEI abilities at its second stratum (MacCann et al., 2014; Mestre et al., 2016). According to Figure 2, it is possible to foster the second-stratum cognitive abilities CHC's model with the AEI. At the top of the model is *g* factor and at the bottom are the primary mental abilities.

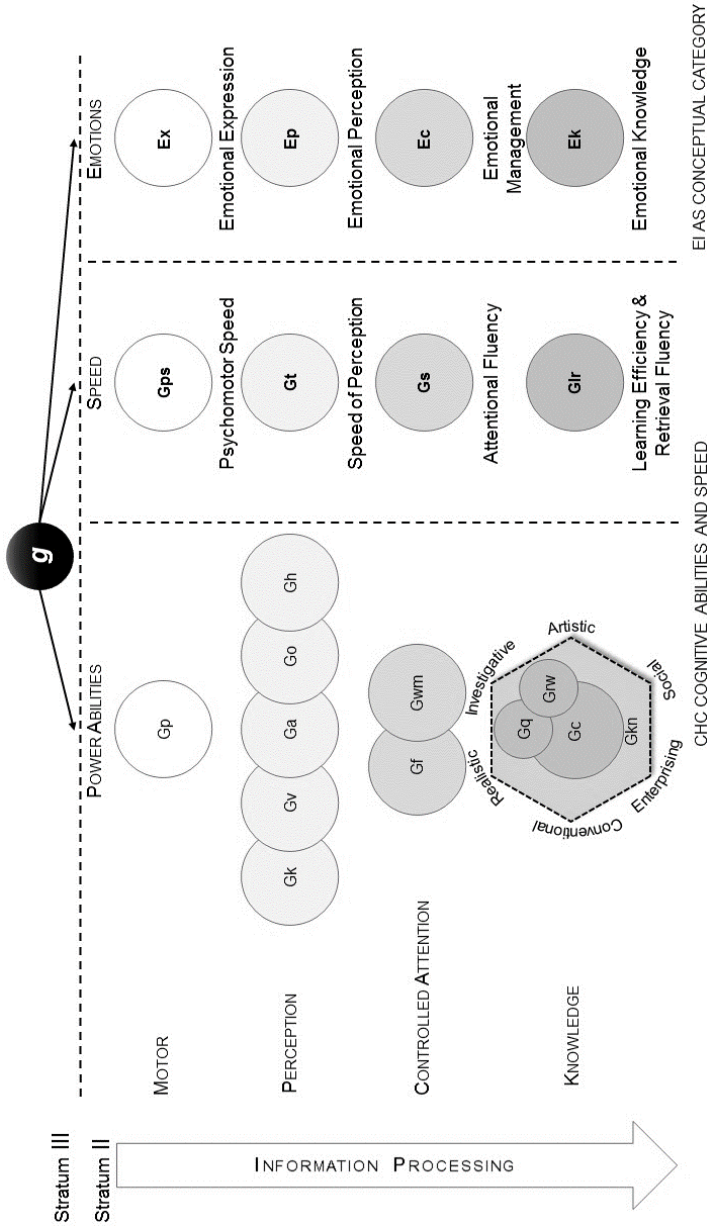


Figure 2. Cattell-Horn-Carroll (CHC) Theory of Cognitive Abilities with Emotional Intelligence (EI) as a Conceptual Category. A representation of CHC Theory of Cognitive Abilities at Stratum II linked to Emotional Intelligence as a conceptual category. Every level of the power abilities of information processing (motor, perception, controlled attention, and knowledge) and the speed of each one are related to each ability of the EI as a conceptual category. CHC Theory has three strata; the first stratum is not represented in the figure. Legend for Motor Level: Gp is Psychomotor Abilities. Legends for Perception Level: Gk is Kinaesthetic, Gv is Visual-Spatial, Ga is Auditory, and Gh is Tactile. Legends for Controlled attention: Gf is fluid reasoning and Gwm is working memory. Legends for Knowledge level: Gc is Verbal Comprehension & Knowledge, Gq is Quantitative Knowledge, Grw is Reading/Writing, and Gkn is Domain-Specific Knowledge. Based in Schneider & Newman (2015).

In the second stratum of the CHC model, there are broader cognitive abilities than in the first (see Flanagan & Dixon, 2013; McGrew, 2009). In this level, it has been reported that AEI's branches are closely related to perception and motor expression (with perceiving and expressing emotions), attentional control (with emotional regulation), and knowledge (with understanding emotions) (MacCann et al., 2014; Mestre et al., 2016). These relationships are reflected in Figure 3. Although in a posterior reanalysis of the data, Legree et al. (2014) found the four components of AEI in the second stratum of the CHC model.

To summarize, it might be hypothesized that by developing the capacities of the CHC's second stratum, abilities set in the AEI framework will also be developed (Mestre et al., 2016). Therefore, if the contents of the subjects such as maths, natural sciences, humanities, and social sciences develop the CHC model's abilities, the next assumption would be that AEI might also be positively affected by this development. Recently, a positive relationship between AEI and academic achievement has been reported in a meta-analysis (MacCann et al., 2020), however, I strongly believe that this relationship between AEI and academic achievement is probably complementary, which means that higher academic achievement during school stages will also develop higher AEI scoring. Next, and the last principle would give a clue of how to transversely implement AEI over school subjects.

The *seventh* and the last principle of Mayer et al. (2016) is that *EI is focused on the processing of information involved with information that has special meaning for individuals* (in fact, they called it *hot information processing*). Mayer et al. (2016) divided processing information into hot and cool. *Cold information* is information related to facts or meanings of no personal value to people, like the calculation of a mathematical equation. However, *hot information* is any information that has meaning to an individual, as social acceptance, coherent identity, or emotional well-being (Mestre et al., 2016). Unlike other intelligences, AEI deals with hot information, which has an adaptive value and meaning for people (Mayer et al., 2016). Understanding this difference between hot and cold information is important to develop the AEI in people, hence, any mental activity that connects cognitive capacity with this type of information is, theoretically, an act of EI development (Gutiérrez-Cobo, Cabello, & Fernández-Berrocal, 2016).

Emotions have an adaptive function (Izard et al., 2011), hence, AEI is using the hot information set for improving our social and personal functioning (Barchard, Brackett, & Mestre, 2016; Mestre & Barchard, 2017). Besides, Mayer et al. (2016) pointed out that the AEI use this hot information from emotions with precision and accurately.

With all arguments exposed above, how could research on ability emotional intelligence be carried out without implying a revolution in the curricular projects of schools? Several EI programs at school and their impact are documented (Nathanson, Rivers, Flynn, & Brackett, 2016). However, it is also demonstrated that it is better to

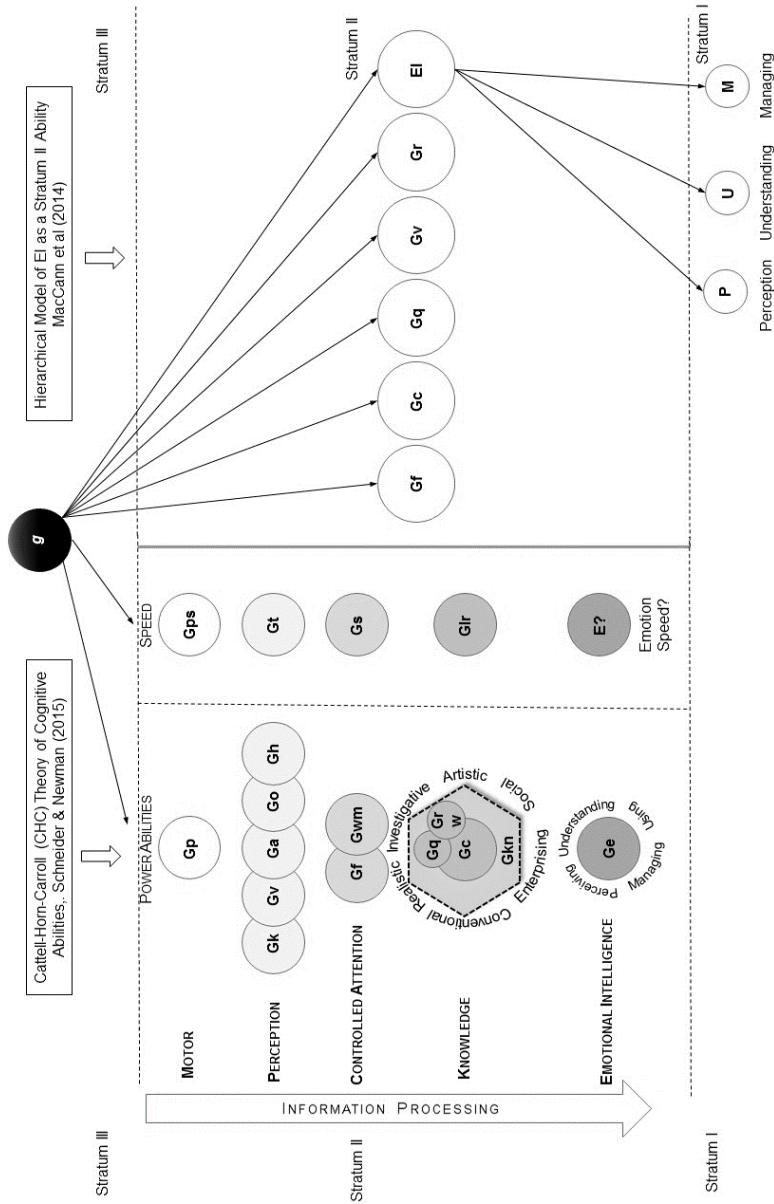


Figure 3. Cattell-Horn-Carroll (CHC) Theory of Cognitive Abilities versus Hierarchical Model of EI as Stratum II Ability. A representation of CHC Theory of Cognitive Abilities at Stratum II (Schneider & Newman, 2015), which is related to the Hierarchical Model of EI as a Stratum II Ability. According to MacCann et al. (2014), Emotional Intelligence (EI) belongs to the second stratum and its three main branches are included in the Stratum I (Perception, Understanding, and Managing, PUM; Facilitation branch is removed due to its redundancy with perception and managing). Figure 2 describes all represented legends.



implement it transversely and through several school years than through a brief educational program (UNESCO, 2014).

### **The Relationship between Ability Emotional Intelligence and both Social and Personal Functioning at School**

Durlak, Domitrovich, Weissberg, and Gullotta (2011) conducted a meta-analysis showing the results that integrate a systematic process of social-emotional development programmes (called social-emotional learning, SEL). According to authors, the implementation of these SEL programmes increases academic success, shows improvements in the relationship between pupils and teachers and reduces disruptive behaviour in the classroom (Durlak et al., 2011). SEL refers to the processes involved in the development of emotional knowledge and the regulation of emotions in oneself and others that improve interrelationships and socially desirable decision-making (Durlak et al., 2015).

Under SEL programs at school, their AEI implementations have improved well-being, quality relationships, academic performance, and school adaptation (Mestre et al., 2006; Nathanson et al., 2016). This relationship is a good social and educational investment (Belfield et al., 2015) but there is need for teaching long-term SEL skills in educational settings (Brackett & Rivers, 2013; Nathanson et al., 2016). However, it is not easy to change traditional educational systems and to add SEL long-term programs. Although short-term SEL programs, such as RULER in the USA (Nathanson et al., 2016) or INTEMO for adolescents in Spain (Ruiz-Aranda et al., 2013), have been implemented, little is still known about the long-term effects of these SEL programs (MacCann et al., 2020).

Using hot information processes, it is feasible to teach AEI transversely through the school subjects. Any school-cognitive activity is likely going to improve any ability set in the EI framework (Mestre et al., 2016). Instead of short-term AEI programs, it is more desirable to implement longer ones. However, as far as we know, there are no experiences of implementing an AEI subject or a long-term AEI program at school because this option implies a strong will among policymakers - despite good outcomes after short SEL experiences. Nonetheless, there is an alternative non-specific approach. Instead of a specific AEI program, it is feasible to include meaning and significance (hot information) in most of the subjects. Then, the AEI-implementing challenge is how to include this meaningful information in traditional subjects. According to Figures 2 and 3, the connection between EI abilities and CHC's cognitive abilities would provide generalisations of the education-emotion programs, and there are enough school scenarios for this promising relationship (Deneault & Ricard, 2011; Kemeny et al., 2012; Lopes et al., 2012; MacCann et al., 2020; Nathanson et al., 2016; Petrides, Frederickson, & Furnham, 2004).

For example, Ivcevic and Brackett (2015) pointed out that explicitly teaching of AEI also enhances students' ability to solve complex and real problems in daily life (even at school stages). Wouldn't it also be the other way around? If students pay

attention (second stratum, attentional control) during the resolution of a math problem, and based on their math knowledge (knowledge, see Figure 2) they may successfully solve the math problem. Hence, students' increasing CHC's abilities set in the ability emotional intelligence, too. Most of the school subjects require the development of cognitive abilities and skills and vice-versa. Next section tries to explain how to include this hot-emotional information in some key school subjects.

### **Developing Ability Emotional Intelligence Transversely through School Subjects**

As we stated before, some authors consider the second AEI's branch, *using emotions*, to be set within the other branches. Hence, we can focus on the rest of the EI abilities. On the one hand, natural sciences and the science can help the development of both perceiving and understanding emotions. Solving science tasks may improve the attentional control, and so emotional regulation may improve as well (see Figures 2 and 3). On the other hand, social sciences and humanities may be very useful in fostering emotional understanding in social-functioning situations. Besides, the different contingencies arising from the social interaction between students and teachers, and the students among themselves, are valid opportunities for growth of students' ability to regulate emotions.

### **How Science and Natural Sciences Can Optimize the Ability to Perceive Emotions Accurately? Some Suggestions**

Sciences and natural sciences are linked to the development of cognitive abilities. To understand a science problem, we need to perceive and understand the situation accurately, to make the best decision for solving the problem, to monitor it, and to check and implement a strategic plan. Hence, to develop ability emotional intelligence, students also need to improve the required abilities in these subjects.

All cognitive and emotional processes begin and end with the perception. Regarding EI, perceiving emotions is the capacity by which AEI begins to be activated (Mayer et al., 2016). Besides, the key to perceiving emotions relies on the term accurately (Mayer & Salovey, 1997). However, to say precise can be necessary, yet not enough. Because perception is a double process, mostly simultaneous, of the so-called top-down and bottom-up processes (top-down vs. bottom-up, Kosslyn & Miller, 2013).

On the one hand, according to Galotti (2008), bottom-up processes occur when people comprehend in terms of what we perceive from the data, just like they are - strictly to what sensory organs perceive from social-interaction situations or environment. Hence, bottom-up processes improve the accuracy of perceiving emotions, but they also imply a greater mental effort and not being mediated by automatic filters such as beliefs, stereotypes or prejudices (Mestre, Gutierrez, Guerrero, & Guil, 2017). Besides, this bottom-up cognitive process is one of the

goals of mindfulness-based intervention, which also searches to perceive emotional experiences without valuing and to clean the cognitive filter of the turbidity of preconceived ideas (Turanzas, Cordón, Choca, & Mestre, 2020). On the other hand, top-down cognitive processes are related to how people interpreted their gathered information from sensory organs and most of these top-down processes are an automatic process, which leads people to wrong decision-making (Kosslyn & Miller, 2013). This top-down process encompasses mental capacities involved in directing both observation and external stimuli towards prior ideas acquired from an already acquired exploration (Goldstein, 2008). Therefore, most of the emotional perceptions might not be accurate and will require emotional perception training (García-Gómez, Guerra, López-Ramos, & Mestre, 2019). Accurately perceiving emotions will require mental effort, paying attention to the stimulus carefully - labelling accurately the emotional expressions of others (Elfenbein et al., 2008). Consequently, it is more effective to identify emotions by what our senses report to us than by what our expectations report to us, which would be a top-down process (Mestre et al., 2017).

According to Kahneman (2011), when people make decisions, they follow two reasoning system (with or without the involvement of the emotions). System 1 operates quickly and automatically, with little mental effort and without a sense of attentional control. Conversely, System 2 focuses attention on challenging mental activities such as a complex math calculation or as a social-emotional conflict between two friends. This System 2 implies the use of attention so that this cognitive activity is not disturbed. System 2 activities are likely similar to: being attentive to the definition of a problem, paying attention to school-subjects explanations, being able to carefully listen to an answer after an inquiry, looking for the correct answer in a school multiple-choice test, observing an adequate teacher's behaviour after mediating during a peer's conflict in the classroom and so on. All these actions require attention, concentration, cognitive planning, monitoring, understanding and management of available information. In the same way that EI needs attentional control for the development of an action that allows a successful solution, for example in an emotional conflict (Mestre et al., 2016). Without the active role of attention, these activities are performed poorly or not at all, and it is linked to the mental effort and learning processes (Kahneman, 2011).

Therefore, the difference between an accurately and not-accurately (miss/over interpretation) of emotions relies in using the Kahneman's system 2, the mental effort, and the controlled learning processing (Breslin, Zack, & McMMain, 2002; Dodonova & Dodonov, 2012; Pell, Jaywant, Monetta, & Kotz, 2011; Swart, Kortekaas, & Aleman, 2009; Wells, 2002). Any controlled learning processing is occurring during school stages (Griffiths & Tenenbaum, 2006). For instance, Medina, Pérez-Alarcón, Reyes, Ceballos-Zúñiga, and Mestre (2012) related both AEI (measured with the MSCEIT) and social-sensitivity scores (measured with the TESIS, Barraca, Fernández-González, & Sueiro, 2009). Findings showed that the people with the lowest AEI scores were also those who scored significantly highest on the TESIS's over-interpretation subscale. However, high social sensitivity that

implies precision in emotional judgments, was significant and positively related to AEI. Therefore, AEI avoids using biases when people are using their emotional perception to judge social-emotional interactions (Medina et al., 2012).

The rule to be followed may be related to the learning opportunities at school. Any school activity, which improves both cognitive and emotional information processing, will improve emotional perception ability. For example, both social and emotional conflicts at school are common among school peers and between students and teachers (Waters & Thompson, 2014). These emotional experiences, positive or negative, will lead students to observe how their teachers solve emotional conflicts at classroom. For example, Mayer and Salovey (1997) described an example of school peer conflict - after the reasons were explained between involved students and teacher, all classroom peers had to write a brief redaction of why that situation happened so they could talk about it later. Writing requires interesting cognitive abilities related to AEI. Later, students had to read their redactions in front of the rest of peers, they had to pay attention in their thoughts about the conflict, to give explanations, to understand and identify causes and effects. This implies spending school time in solving social and emotional conflicts in the classroom; however, this also provides another type of learning and improves social adaptation at school (Mestre et al., 2006). Besides, vicarious learning through teachers' emotional managing is another learning opportunity. When teachers use their emotional experience for solving school conflicts, students learn emotional intelligent behaviours and resilience from them (Cassidy, 2015; Windingstad, McCallum, Mee Bell, & Dunn, 2011).

For science to improve emotional-cognition abilities as well, it is necessary to introduce meaning and hot information in these subjects. For example, imagine this simple math problem: to John, a 9-year-old boy, his mother gave 20 euros so he can buy candies for his classmates because that day was his birthday and he wanted to share his happiness with them. Regrettably, just before entering in the candy store, John noticed that he had lost several of the most valuable coins along the way, so John had 7 euros and 56 cents left. The question is obvious; how much money did John lose? A primary-school student likely knows to subtract the 7.56 euros from 20 to know that 12.44 was the solution. But what if we add one more question? If you were John, how would you feel after losing a good part of the money that your mother gave to you to buy candies for your classmates? Let us imagine that children have to pick up an answer from next options: sad, angry, surprised or worried. When someone lost something valuable to them, sadness is the expected emotion (Zimmermann & Iwanski, 2014). However, students, who answered *angry* might have a lack frustration tolerance (Guerra et al., 2019); those that picked up *surprised* it could be due to their lack of social sensitivity (Toivonen et al., 2012), and *worried* is a signal of social anxiety (Anastopoulos et al., 2011). Therefore, when a science teacher introduces hot information and meaning to their students' school activities, there is an opportunity to increase emotional knowledge, AEI or theory of mind

among students. Besides, when AEI is being developed, their academic achievements are also improving (MacCann et al., 2020).

Perceiving, understanding, and managing emotions are not quite different from perceiving, understanding, and managing science challenges. When students are performing and implementing science strategies they are also improving their cognitive abilities that are involved in the emotional intelligent behaviour.

### **Social Science and Humanity Subjects Can Optimize Emotional Understanding and Knowledge**

Nowadays, humanities and social sciences do not have the same status as science and natural sciences. However, humanities have an interesting role in the development of knowledge and social-functioning understanding.

Understanding emotions is a capacity that is closely linked to crystallized intelligence (*Gc*) (Husin, Santos, Ramos, & Nordin, 2013), which is based on experience and accumulated knowledge (Mestre et al., 2016). The accumulation of knowledge through lived experiences, learning, readings, and culture activities improve the abilities related to *Gc*. The emotional knowledge is also part of this *Gc* and has been considered as "the core of intelligent regulation" (Wranik, Barrett, & Salovey, 2007, p. 395). Understanding how emotions combine, progress and change over time and situations (Mayer & Salovey, 1997) requires a lot of both learning and instruction, to such an extent that the evolutionary and adequate development of EI requires an appropriate cognitive, social, moral, emotional and linguistic development (Carpendale & Lewis, 2004; Hawn, Overstreet, Stewart, & Amstadter, 2015; Petrides et al., 2016). Besides, understanding social emotions (guilt, shame, jealousy or anxiety, for example) requires more time than basic emotions (joy, sadness or anger, for example) (Izard et al., 2011).

Subjects linked to the social sciences and humanities can contribute the most to the emotional knowledge improvement, and, hence, emotional understanding. In fact, the third AEI branch, emotional understanding, has achieved the best positive and significant relationship with academic performance in this type of subjects (Durlack et al., 2015) because students have feedback with social-learning experiences.

For example, literature is a subject that may provide meaning significance to emotions, especially, social emotions. Shakespeare's *Othello* is an opportunity to understand the differences and connections between jealousy and envy. *Othello's* plot is complex, but understanding the role of emotions in the characters of Iago and *Othello* helps to understand the differences between envy and jealousy (Crawford, 2009).

Understanding the character motivations of Shakespeare's book requires to know why *Othello* feels jealousy and Iago feels envy. What are the mechanisms that lead them to feel that way? Instead of describing "Othello", it would be

commendable to use hot information to understand its plot and why jealousy and envy were induced by the contingencies of its characters. The Moor Othello is a general in the service of Venice; he has won the love of Desdemona, daughter of Senator Brabantius - the Dux of Venice. In the beginning, Iago wants a military promotion, however, he suspects that the post was given to Cassio because of Desdemona's friendship with him and because he was a go-between in the courtship of Othello and Desdemona. For this reason, Iago declares his hatred for the pair. Iago envies Cassius and succeeds in discrediting him by getting him drunk and disturbing the public peace. Cassio was deprived of his degree, yet the envious Iago induces Cassius to beg Desdemona to intercede on his behalf; simultaneously, Iago makes Othello suspect that his wife is cheating on him with Cassius. The Machiavellian action of Iago takes effect when Desdemona intercedes with Othello on behalf of Cassius. This provokes in Othello the confirmation of the suspicions induced by Iago and creates in him feelings of jealousy. The envious Iago manages to have a piece of garment that Othello gave to Desdemona be found in Cassius' possession. Othello, blinded by jealousy, strangles Desdemona in her bed. Finally, Iago's plot is discovered, and Othello commits stoic suicide.

Jealousy is emotion in which two people are involved, however, jealousy needs three, in which the jealous person feels threatened by the belief that their partner feels something for a third person (Salovey, 1991). Understanding the transition between emotions and the causes and relationships of a literary work undoubtedly helps to understand complex-plot emotions. The subjective state of an envious person is to want what the other person has, and in a hostile attitude to come to wish that the other person loses what the envious person longs for (Lazarus & Lazarus, 1996).

The plot of Shakespeare's Othello points out that there are real and academic possibilities where students can be, in maieutic manner, interrogated and stimulated to find answers and increase the opportunities of students to improve their knowledge about emotions, especially the social emotions that have a higher cognitive demand than the basic ones (Mestre et al., 2017). Specifically, if we include hot information as emotional plots in this type of subjects, we are also promoting the understanding of emotions. History or literature, and even religion or ethics, are susceptible to being transversally analysed for emotions.

Literature, history, and language have a key role in the development of crystallized intelligence; hence, knowledge and relevant experiences are crucial for development of emotional knowledge as well.

### **School Interactions are Relevant Learning Experiences for Promoting Emotional Regulation**

Social functioning is a relevant outcome highly linked with mental health (Mestre et al., 2016), and the development of a good emotional regulation provides an important mediating role between positive mental health and their mechanisms of change (for example, teaching at school).

Emotional regulation (ER) focuses on the process of how people use certain abilities (especially, appraisal and attentional control) to influence what emotions they have, when they have them, and how they have to be expressed (Gross & Thompson, 2007). Gross and Feldman-Barrett (2011) described ER as a transaction where there is a given situation that involves a person's attention towards a relevant goal, which activates an interpretation and a response (cognitive, behavioural, and physiological). Peña-Sarrionandia, Mikolajczak, and Gross (2015) suggested integrating, simultaneously, regulation of emotions and EI to understand how emotions are better or worse managed from individual differences on EI scores. People with a high EI use strategies such as positive reappraisal and direct modification of situations, however, those with a low EI score tend to use more avoidance and ruminative thinking (Peña-Sarrionandia et al., 2015). To summarize, people with good EI seem to use a mechanism to translate their emotional knowledge into effective ER strategies (Mestre et al., 2016). This supports the view of the EI hierarchical framework of Mayer and Salovey's (1997), in which they postulated that an adequate development of an accurate perception of emotions is needed to later begin to understand them, and once a good knowledge has been developed, people can effectively manage their emotions.

School life is a socialization process (UNESCO, 2014), which involves and provides opportunities to develop the ability to regulate emotions. The desire to please others, to comply with the rules, to generate good academic performance, to avoid or diminish disruptive behaviour, to know how to mediate conflicts that arise, to negotiate with teachers or classmates, and to improve the quality of relationships within the community are situations that imply adequate management of emotions (Nathanson et al., 2016; Opataye, 2014; Sánchez-Álvarez, Extremera, & Fernández-Berrocal, 2015; Zeidner, 2017). Facilitating, advising and monitoring students to be the protagonists of these changes, situations or conflicts are opportunities for the development of the key capabilities for the complete development of EI, the regulation of emotions (Lopes et al., 2012; Parker, Summerfeldt, Hogan, & Majeski, 2004).

Emotional regulation requires a major development of cognitive abilities set in the second stratum CHC model, especially development of attentional control (Mestre et al., 2016).

## **Conclusion**

This proposal does not invalidate any specific EI intervention at school. Any activity to improve EI, even if it is short term, should be welcomed. However, in the long term, the effects of a short-and-specific EI intervention are often diluted over time. An alternative is that it is possible to promote EI in a transversal way by introducing hot information in many school subjects. Moreover, the cognitive abilities that most academic subjects foster are also implicit in EI. Unspecific training

in EI is more realistic and certainly more effective in the long term. Ability emotional intelligence (AEI) shares at the CHC model's second stratum the same abilities: perception, attentional control and knowledge. Therefore, any school-based cognitive activity that is linked to the development of such second-stratum abilities of CHC model also promotes, although not directly, the development of EI, i.e., school adaptation and academic performance. An accurate emotional perception requires development of bottom-up perception processes that involve monitoring, changing and regulating stereotypes, prejudices or irrational beliefs that affect the emotional processes (Mestre & Guil, 2012). Science and natural science subjects are appropriate for the development of emotional perception. A number of studies provides a proof of the importance of this capacity of perceiving emotions accurately, that combine mindfulness (which is negatively related to negative emotions) and EI, which is related to the promotion of affective states (Mestre et al., 2019). Mindfulness-based interventions provide tools for improving bottom-up processes (Flook et al., 2010) and EI interventions develop good emotional states and social functioning (Lopes et al., 2012; Lopes, Salovey, Coté, & Beers, 2005; Mestre et al., 2006). It has been suggested, with promising outcomes, that mindfulness activities should be included in academic subjects (Zenner, Herrnleben-Kurz, & Walach, 2014).

Regarding emotional understanding and knowledge, social sciences and humanities can be enhanced with the inclusion of hot information processes (such as social and existential emotions). Unfolding the plot and meaning of different themes of History or Literature would require improving reasoning, the ability to connect causes and effects and to understand the role of emotions (Mayer et al., 2016). Including hot information in these subjects also gives a meaning understanding as we described above with Othello.

Finally, emotional regulation implies a greater number of effort and cognitive development - including linguistic, social, emotional and moral. School's daily life is full of opportunities and interactions where students might be advised and guided by the teachers. Emotional regulation is the key capacity for solid personal and social functioning (Mestre et al., 2016).

This perspective of adding hot information to the teacher's task seems more viable and realistic, and we also implement a greater temporality of these influences in the development of students' EI. We hope, with this article, to stimulate teachers to this feasible challenge.



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Received: January 10, 2020