The practice of silence as an educational tool: guidelines for competence-based education[1]

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Abstract

The characteristics of contemporary educational environments, abundant in activities and often-excessive use of digital technologies, highlight the need for providing psychophysical balance to the student inner experience, current situation that stimulates teachers' interest to the consideration of silence as an educative act, crucial to any less saturated, and more balanced formative process. Current scientific literature is reviewed here about silence as an enhancer of neurophysiology, e.g.: on neurogenesis and default network inductor; and psychosocial development, e.g.: on self-regulative attentional skills and/or language processing quality; suggesting it already involves the preconditions to be systematically introduced as a pedagogical tool, a task still to be done and to which this paper tributes. For this goal, a brief review on the contemplative orientation in teaching and learning is exposed as a theoretical and practical framework interested in silence as a tool of learning, psychological growth, and social transformation, through awareness development and relational-ethical behavior. Some implications are described then for competence-based education, and the possibility of articulating the practice of silence with the development of procedural competences. Finally, some limitations are addressed in order to raise awareness of the best path to tread in promoting silence and its benefits for teaching and learning environments

Keywords

Competence-based education – Alternative education – Pedagogical guidance – Knowledge updating - Mindfulness.

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Introduction

Within the last decade, a strong interest in the study of the students' well-being along the course of their developmental path is observed, bringing up many novel ideas to its promotion (BARRY; CLARKE; DOWLING, 2017). For that purpose, dedicated research has highlighted the achievement of body-mind integration and life satisfaction through the mindset embedded in stillness, quietness, and silence (TRAN; HARIJANTO; VU; HO, 2020); offering the field of education valuable information concerning the neurophysiological and psychosocial effects implied, as well as the methodology and technique to attain them. This research line is often referred to as 'the silent revolution' (ZAJONC, 2013); and it involves concepts like mindful awareness, attentional development and consciousness, but also the contributions of less-known scientific fields like contemplative neuroscience, contemplative education, and in a broader sense, spirituality. These disciplines had been the hard-data source for several educational programs meant to develop attentional and behavioral regulatory skills through the practice of silence (e.g.: HUTCHINSON; HUWS; DORJEE, 2018; LÓPEZ-HERNÁEZ, 2016; WATERS *et al*., 2014; MEIKLEJOHN *et al*., 2012), which gives a visual scope about the projections, and applicability of the emerging evidence in contributing to a more holistic and evidence-based approach to the student's overall psychosocial growth and well-being.

Nevertheless, there is also a side to the understanding of silence in educational environments that does not reside on the positive effects that take place when students practice it, or the number of successful programs to exist, but in an adequate alignment of the empirical data with the current curriculum requirements. Specialists argue that the different steps of the development of the curriculum need to articulate to each new piece of information that differs from the intended curriculum that can consequently enrich it (SHUEY *et al*., 2019); thus, in a reciprocal sense, the new data must be suitable to the curriculum to guarantee it will be managed from a pedagogical perspective. Bearing that in mind, the overarching aim of the present work is to contribute to these thoughts in two streams of analysis: firstly, we look at the empirical evidence as a pivotal axis to build effective educational intervention strategies to develop an attention that is rooted in silence practices; and secondly, we set out some thoughts and suggestions on the right path to contribute to the mentioned alignment between silence, its theory and practice, and current curriculum requirements, as requested by competence-based education (hereinafter CBE).

The need for silence

Pedagogy has often been modest in systematically introducing contemplative experiences in any of its forms, despite the fact that self-regulatory skills develop from its practice with a well-known impact on learning and behavior (TONIOLO–BARRIOS; BRASIL; PITT, 2020; DENG *et al*., 2019). Much of this evidence has been partially met with evasiveness from the educational community, mostly due to the 'not such an important role' of non-goal-oriented behaviors, as opposed to the functional and preferably targeted

ones, and/or also due to the understanding of silence not as an expression of agency (HAO, 2011); with some evidence to align with that (LERÍA DULČIĆ; SALGADO ROA; SASSO ORELLANA, 2018). Although this predisposition is understood in the light of countless evidence that nurture secular educational models about the importance of functional skills, the need for silence is not a cliché issue by the times in which we live, and it must be addressed by scholars.

The age of overstimulation has reached unexpected proportions constantly increasing effects that jeopardize psychical and mental health. Many authors agree that technologies of the modern world, especially the digital ones, '[...] perpetuate certain forms of thinking that create them, yet once in use our thinking and behavior are reshaped in turn' (HADAR; ERGAS, 2018, p. 1), and many related studies are recalled here. For example, watching fast-paced television in the first 3 years of life is linked to hyperactivity, and later attentional deficits in childhood (CHRISTAKIS *et al*., 2018); the use of bedtime technology is correlated to higher body mass (FULLER *et al*., 2017); just only 5.2% of students openly state that noise in the classroom is pleasant (CASTRO; MORALES, 2015); and a worrying link is also found between overusing online social networks and density of grey matter in regions of the brain implicated in social cognition (VON DER HEIDE; VYAS; OLSON, 2014). Even though the aforementioned examples can be found in current scientific literature, the dynamic relationship between overstimulation and silence, in our opinion, has not yet been fully recognized by teachers and professionals from the educational field.

What is to practice silence in an educational environment?

Being silent has usually been limited to different referents, primarily as just an absence of noise to a form of resistance, discipline or omission (WU; WENNING, 2016). However, when silence is intentional, voluntary and mediated by practice, the experience opens beyond, and gives rise to new experiential deeps for the practitioner. Nowadays, this takes the form of mindful awareness or contemplative practices, which are generally defined as an attentional body-mind exercise that is enhanced by the individual in solitude or groups. There are many kinds of such practices, some stemming from ancestral spiritual traditions, others newly created, to mention a few: mindfulness, sitting and walking meditation; guided body scan meditation; conscious listening; conscious movement; art in many of its forms; conscious eating; and so on (ROBINSON; EID, 2017). Although all of these practices are *per se* typical silence practices, many other activities also have the characteristic of bringing up a special mode of attention and bodily sensibility (DAHL; DAVIDSON, 2018); e.g.: music performance, debate, pilgrimage, social engagement, rituals, and many others (The Tree of Contemplative Practices, n.d.). The classic contemplative practice usually involves some preparations and inductions (e.g.: progressive relaxation, counted breath, body scan, guided imagery, encompassed movements, and others); holding the reached feeling/state; and in some cases, expressing or sharing the experience (verbally, through art or similar expressive actions). In school settings, it is often practiced in groups on a daily or weekly basis, but more often as part of activities within a defined setting and length of time (LERÍA DULĆIĆ; SASSO ORELLANA; SALGADO ROA, 2019).

Among the approaches concerned with this goal, contemplative education has been the one trying to consistently and systemically formulate the practice of silence and attention development for educational environments (WEARE, 2019; WATERS *et al*., 2014). Several contexts had enabled its rebirth in the West (LERÍA DULĆIĆ, 2017); and it is defined as a form of holistic education in which contemplative practices are integrated into educational settings to enhance learning and psychosocial development. It is nourished by the contribution of a series of scientific areas to enrich the educational practice with scientifically validated procedures that have a universal preventive character and enhance the global development of the student.

Scientific findings and the multidimensional impact of silence practices

The empirical research associated with silence had already encompassed different constitutive dimensions of the individual, with rapidly burgeoning literature that addresses well-known silence practices, like mindfulness, yoga or Buddhist meditation (e.g.: COOPER; YAP; BATALHA, 2018; SHUTE, 2018; ZENNER; HERRNLEBEN, WALACH, 2014). In the following section, this article links to several strands of scientific literature that emphasize the broader impact of silence practices of special interest for educational purposes, and following that, some less known research lines will also be exposed here.

Neurogenesis and the effect of rest-induced states of the brain

Silence appears capable of playing a relevant role when it comes to brain development. An exemplary and classic study in this field, 'The sound of silence is music to the heart' (LARSEN, 2005), describes the effect of turning the music off on respiratory frequency, heart rate, and blood pressure, which all decreased below baseline levels in experimental subjects. It is then concluded that induced states of silence and rest are useful for the homeostatic balance of the organism, which is fundamental after continuous activity, as well as prior to action, as many studies in the educational field confirm. For instance, relaxation training through biofeedback techniques help to relieve emotional disturbances in undergraduate students before examination (GHOLAMI TAHSINI *et al*., 2017); attentional practices of mindfulness also decrease stress and academic anxiety in students (BAMBER; KRAENZLE, 2016). However, the impact of silence is more expansive than it was initially believed, and another suggestive study contributes to visualize it: 'Is silence golden?' is aimed at exposing the effects of auditory stimuli on hippocampal neurogenesis, the main brain region associated with memory and learning (KIRSTE *et al*., 2013). Accordingly, turning off all experimental conditions, except for white noise (pop up calls, music, and silence), results in increased cell proliferation, with only silence remaining and doing the same thing after seven days. Although many of the former studies were conducted on experimental subjects, other studies have linked the states of brain rest induced by silence in meditation practitioners, with larger hippocampal density (LUDERS; THOMPSON; KURTH, 2015); and, for example, fewer learning errors in memory tasks (GREENBERG *et al*., 2018).

As concluded above, the absence of overstimulation is a vital condition for biological restoration, and consequently, it is relevant enough to be considered by professionals in the educational field who are looking for the best psychophysiological conditions for learning. In this matter, silence must be approached from a structural level, e.g.: standards for auditive isolation; as well as from the functional one, that is, from the nurturing of educational experiences that guarantee the presence of an adequate amount of silence in a typical learning day.

The basal state of the brain

Having already emphasized the importance of silence in neurogenesis, it is worth drawing one's attention to another related issue: the type of neuronal net activated, and the brain's ability to then modulate later cognitive performance and emotional experience. The basal state of the brain or default mode network (DMN), is defined as a large-scale of interacting brain regions highly correlated with each other. The findings suggest that silence practices are associated with this kind of cross-network functional connectivity in medial fronto-insular-striatal networks, crucial for top-down attention and emotional regulation (HERNÁNDEZ *et al*., 2018). Particularly interesting is the fact that learning is a complex phenomenon which requires flexibility to transform existing neural nets into new and reshaped ones, a process associated with these dynamic networks. It is distinct that the optimal conditions for learning are nurtured by this kind of connectivity. Evidence shows that the default mode network seems to be associated with increased metabolic activity in some core areas of the brain, hosting abilities such as outward attention (GARTENSCHLÄGER *et al*., 2017); it concludes that the development of attentional skills make a stronger and long-lasting DMN type of connectivity, as is achieved by mindful awareness and/or mindfulness practices (BAUER et al, 2019; MARUSAK *et al*., 2018).

Taming of the attentional reflex

The need of our brain to direct attention to constant novelty has generated a subsequent educational technology focused on such learning environments, varied in content and stimulation. Environmental enrichment is known to affect the central nervous system at functional, anatomical and molecular levels, especially during childhood (SALE, 2018). However, in our age, enrichment very easily becomes overstimulation, forcing the brain to permanently deal with a multitude of stimuli, adapting to them and shaping the perceived environment in the limits of the processed data. It is then described that the attention is dynamically modulated by changing biological arousal levels (DE BARBARO; CLACKSON; WASS, 2016); and when the brain is permanently disturbed or overstimulated, attentional difficulties and behavioral maladjustment are expected (SCARPA, 2015). This leaves teachers with a familiar conclusion: physiological and cognitive arousal affects children's ability to hold attention and concentrate, and then to learn. However, some useful empirical data is missing from teacher's mind on the way to effectively cope with that: the brain encodes some aspects in silence equally as during physical stimulation

(TAMAKOSHI *et al*., 2016), which suggests that the attentional skills achieved by practicing silence are similarly coded in the brain, but with lower arousal levels, and then with less interference for latter cognitive processes (MAK *et al*., 2017).

The coding of the perception of time

One of the usual difficulties in the classroom refers to the characteristic impatience, haste, and need of students, especially the young, to finish given tasks as quickly as possible. The curious characteristic of their perceiving time as passing very slowly while in a long, unattractive or difficult task, usually generates uneasiness, distraction, and dissatisfaction. Therefore, it becomes a daily duty for teachers to apply strategies that lessen this effect. Cognitive neuroscientists have made significant headways in understanding how the brain gives rise to a sense of time, revealing startling knowledge about the organization of associated neuronal networks, and asserting that its transmission is in effect physically slower in children than in adults (COSTELLO *et al*., 2009). Neuro-scientific research on this relationship shows that the middle frontal-limbic and posterior brain regions seem to mediate the attentional functions underlying the perception of time; but with increasing maturity, time discrimination is progressively under the control of focal, lateral, and parietal regions. In other words, time perception migrates from a sensory/emotional basis to a cognitive/executive one. Then, the cognitive accuracy that emerges implies that time interval perception is longer: seeing more details in a task implies that time is perceived as going slower (PÜTZ *et al*., 2012); and the opposite occurs when fewer details are perceived: time is experienced as passing away more quickly. Studies describe that regular silence practices enhance the ability of attention regulation in everyday non-meditative states, with an impact on time perception (WITTMANN; SCHMIDT, 2013); helping to perceive it as happening more slowly due to the accuracy of interval perception but without the typical anxiety of a hastier perception of time.

The language of emotions and well-being

Language has an impact on neurophysiological and psychological experiences that occur in defining semantic contexts, and vice versa, bodily arousal influences the categorization and speed of spoken words. A good example of that is found when words expressing physical and social pain convey more intense and unpleasant feelings (BORELLI *et al*., 2018); or faster verbal response times are associated with higher physiological arousal and cognitive load (MEISTER; RÄHLMANN; LEMKE; BESSER, 2018). It is also observed that low arousal words are categorized much faster after relaxation, suggesting that a decrease in bodily arousal promotes a better recognition of certain verbal stimuli matching one's current arousal state (KEVER; GRYNBERG; VERMEULEN, 2017).

Recent studies have shown that the words used in silence practices, as in varied forms of meditation, modulate the words practitioners use to refer to their experiences, as well as the bodily sensations, feelings, and thoughts while describing them (PRZYREMBEL; SINGER, 2018). These findings suggest that the type of silence practice leads to a certain use of words and semantic nets, but at the same time modulates the neurophysiological

and cognitive-affective arousal when using those same words. The significance of this evidence is linked to the unconscious effect of using emotion-related words, for instance, when teachers produce a similar arousal state on student's inner physiological experience, such as when their burn-out is predicted by the morning cortisol levels of his/her students (OBERLE; SCHONERT-REICHL, 2016). Once again, following Przyrembel and Singer's research (2018), silence-related words may contribute to modulate a special awareness and body-mind state, along with a more balanced disposition under daily life's situations besides the silence practices themselves.

Prosocial behavior and silence

There is a solid list of studies concerning silence practices and other socioemotional variables of particular interest to teachers. Studies have shown that contemplative practices have an impact on pro-social behaviors (LUBERTO *et al*., 2017); especially in hyperactive children (VIGLAS; PERLMAN, 2017); on enhancing social connectivity (KOK; SINGER, 2017); and empathic behaviors (LANERI *et al*., 2017); as well as cooperativeness (MONTERO-MARÍN et al., 2016). Nevertheless, new evidence suggests some limitations of this evidence should be considered mostly due to reasons of a methodological nature (KREPLIN; FARIAS; BRAZIL, 2018).

Guidelines on the inclusion of silence practices in CBE

One of the still missing elements to consider about the rebirth of the contemplative approach and its silence practices in western education, refers to the technical articulation of the curriculum in its many forms, which asserts the benefits of silence practices are not *per se* enough to be of concern for professionals in the field. For that reason, it is necessary to go beyond and link the empirical evidence with the current curriculum requirements to give them a recognizable educational purpose. Still, a series of aspects must be addressed to facilitate this goal, and promote them with its corresponding pedagogical standards and didactical elements.

A blind spot in CBE

CBE is the new axis of modern education, sometimes with an uncritical and exponential growth through institutions (HUMPHREYS; CRINO; WILSON, 2017). It emerges from a movement in secular pedagogies aimed to emphasize functionality and performativity; and for that goal, a cumulative set of interrelated capacities is required to deal with professional tasks and real-life problems, finally poured into the so-called competences. Current changes in educational approaches, as well as curriculum innovation, had tried a more comprehensive understanding of what kind of competences are more relevant to be included. Whereas, for instance, autonomous, collaborative, cooperative and situated learning have been redefined in their importance and actively included in the classroom, other competences can also be introduced by responding to adequate and updated criteria of validity and theoretical consistency.

Within the framework of the European Higher Education Area (2009, as cited in PEGALAJAR PALOMINO, 2018, p. 830); different types of competences are defined. Although all of them refer to the person and his/her coping with the environment, some are less functional in nature, without the predominant "do" in its conceptual and procedural definition. An instance is found in interpersonal and intrapersonal competences, which are not exclusively instrumental, but related to the communication of feelings, cooperation and social interaction (ZERMEÑO; LOZANO-RODRÍGUEZ, 2016). Even though these kinds of competences cast some lights on a more subjective experience to be commanded, they also simultaneously aim to fulfill their functional nature towards another object, situation, environment, person or groups, however, not necessary to make the internal and intimate communication of the individual with and within him/herself stronger, clearer or more conscious. From this point of view, a crucial part of human experience is then missing that could be justifiably referred to as a skill, but by all means not easy to tune in with CBE standards due to its all-encompassing nature and lack of a clear functional definition. Nonetheless, there have been many attempts to include a wider sense of what is defined as competence. Many models of emotional and social intelligence imply one or two skills as "from within"; broadly referred to as self-awareness competences (OBERLE; SCHONERT-REICHL, 2017). Further works, for example, by Leclerc and Horan (2017) show through an eight core competences model, a better fulfilment of what is meant by a skill that incorporates an active relationship of the person with him/herself. In this case, internal/external communication is referred to as '[...] the ability to clearly, effectively and naturally transmit/interchange thoughts, feelings, and information both within one's self and between one's self and the world; to listen, speak and write empathetically; to attract others through language and actions; to experience the joy of communion [...]' (p. 6); which implies a definition that is a bit closer to the essential quality of the subjective experience that point forward a more active and conscious relationship with oneself. This implies a kind of subjective functionality that can be considered as competence in the domain of self-awareness and self-regulation strategies (LEYLAND; ROWSE; EMERSON, 2019); and justified in education due to its association with academic success (ORIOL *et al*., 2017); as well as in the development of many other cognitive and behavioral skills (DENG *et al*., 2019).

Silence practices, curricular dimensions and how to approach them

A wide-ranging classification by CBE shows a basic theoretical framework that can help linking the theory and technique behind silence practices with current curriculum requirements, named: KDB (Know, Do, and Be); terms that clarify the dimensions that must be included in any competence-based model (DRAKE; REID, 2018). Nevertheless, the first two categories are not problematic to identify (e.g.: for "Know" competences such as: content command, critical thinking, and/or innovation; and for "Do": managing information; problem solving, and/or collaboration); to some extent, "Be" is not equally as easy. According to the literature, this latter category usually embraces educational policies that focus on mental health, personal growth, socioemotional learning, values and attitudes

(BIALIK *et al*., 2015); and from that perspective, CBE needs to address it with adequate skills and *ad hoc* educational activities. Furthermore and significantly, it is suggested that a non-reductive curriculum of any sort should also include at least three factors, to which should correspond transverse educational activities that approach the student with a whole understanding of what education and personal growth mean. For instance, a curriculum oriented only to the cognitive domain would lack this broader sense; and, therefore, it would not facilitate knowledge of other areas (holistic factor); deprive a significant and transcendent experience beyond the rational element (transformative factor); and would impede a unitary, ecological, and integral global experience of the student with him/herself and the environment (a factor of integration) (FERRER; SHERMAN, 2009).

CBE require learning experiences that provide a formative process which preferably includes all of these above dimensions and/or factors, generating adequate and suitable didactical practices for their acquisition and development. Consequently, silence points to a way to strongly but not exclusively address the domain of "Be" by practices that not only involve the development of metacognitive skills, but may also generate significant socioemotional experiences, and positive meaning about life.

The translation of theoretical and technical language into pedagogy

Promoting silence practices must respond in some degree to the above dimensions and factors by focusing on the transformation of its theoretical constructs and procedural techniques to a suitable pedagogical language to be understood by teachers. Although we believe that education for its own enrichment must nurture itself from other fields of knowledge, this process is not always successful due to many "interferences" in translation characteristically for each disciplinary language. Regarding this, some ideas had been brought into, showing that,for example, a contemplative approach, and its practices, may be validated in an educational community by taking advantage of neuroscience, well-known and accepted by teachers (ERGAS *et al*., 2018).

Metacognition and the role of silence practices to its development

It is important to be aware of what kind of learning skills are needed for future education. The United Nations Cultural Organization guidelines offer a number of visions for the coming years about what to prioritize, with the question: 'What kind of pedagogies are suitable for the 21st century?'; a few propositions came out, from a renewal of the focus on quality to redefining teacher roles and functions (SCOTT, 2015). Within these guidelines it is strongly recommended to explicitly focus on teaching metacognitive and second-order skills in the framework of current pedagogy. Bearing this statement in mind it becomes clear that the development of skills related to 'doings' in real working environments is prioritised and expected, which broadly suggests the importance of teaching to students ways to self-monitoring their performances, but also how they cope with more personal and individual issues. Given that the data accumulated so far alongside the already

existing literature indicates that cultivating silence practices, like mindful awareness in educational environments, leads to concrete strategies to develop such meta-skills (BAUER et al., 2019; COOPER; YAP; BATALHA, 2018; MAK; WHITTINGHAM; CUNNINGTON; BOYD, 2017; ZENNER; HERRNLEBEN; WALACH, 2014), that makes it easy to recall silence practices as a valid pedagogical strategy for CBE on developing metacognition, and such self-regulatory skills.

Current epistemologies and their sympathy or antipathy to silence practices

Another important issue to be brought to the discussion is about epistemology. The influences of current epistemologies on the educational field, secular in nature, functional and critical in tendencies, define the final meaning of education in such a way that the type of acceptable curriculum does not allow easily, and by the force of current sociocultural circumstances, to add other intrinsic and different possibilities. As far as it is concerned with it, often epistemologies manifest in a continuum of two extremes. On the one hand, liberalism privileges rationality and a functional pedagogy for a globalized order; and on the other hand, critical pedagogy argues that this normative approach promotes reflections on the self and not the system in which the self is situated (HARTLEY, 2018). With regard to both options, we would rather focus on a more holistic and non-contradictory approach, where each epistemology and the educational models ascribed to them can enjoy some of the benefits of silence practices without undermining their fundamental notions. One possible option is what some authors prefer to consider about the approaches interested in the study of consciousness, implying the term "Noetic alphabetization" (PAYMAL, 2014), which relies upon the goal to educate students about their consciousness and experiences of themselves (ERGAS, 2015). This implies an approach that is able to contribute to education in many non-invasive ways, which is hard-evidence guided, and oriented towards developing awareness in any given way, from which any educative epistemology can gain some benefits.

Disciplinary trends and their impact on curricular innovation

A series of conditions must also be addressed to ensure that a proposal of such relevance as silence practices is not just a "disciplinary fashion" waiting to be replaced by other more novel or striking activities. In this concern, often new proposals coming from outside education suffer for a two-sided process. Firstly, the initial interest step in a phase of enthusiasm seems to be the solution for all the educational troubles the system has, and a typical example of that is the premature translation of neuroscience for educational purposes (THOMAS; ANSARI; KNOWLAND, 2019). A second phase arises when the collective of professionals gets used to it and looks for a more fresh and trendy approach. Although these tendencies can be conceived as belonging to the expected development of each applied discipline, and its relationship with the empirical evidence, it can be likewise an impediment to extract the best contributions that a scientific discipline may offer to

the enrichment of the pedagogical approach. Another good example of such risk is when the interest for an applied field is moved forward by enthusiasm rather than by rationality and by empirical evidence, visible today, in certain ways, in SEL (socio-emotional learning), and its tendency to emotionalize education with an excessive subjectification of the formative experience (MENÉNDEZ ÁLVAREZ-HEVIA, 2018), rather than applying a more cognitive and self-regulatory skills approach to competences acquisition.

The practices mentioned above can be partly corrected by responding more attentively to the specific requirements of the contemporary curriculum, and a good example of this is found in neuro-didactics (FEILER; STABIO, 2018), a discipline which transforms the evidence from neuroscience to pedagogical strategies, but is not a constitutive part of the foundations of the curriculum itself. The same situation may be applicable to the concept of silence: far from the euphoria of the growing research, it is possible to bring the curriculum closer to focus,for example, into developing socio-emotional competences, or, as we have already pointed out, metacognition. Thus, theoretical evidence-based and disciplinary knowledge can be adequately aligned.

Methodological standards for silence practices

Following the above, the appreciation of silence for educational purposes implies its use in real and situated learning environments, and for that, quality standards must be fulfilled (SEMPLE; DROUTMAN; REID, 2016). For example, it is suggested to strictly choose the empirical evidence that supports the interventions, and define the degree of feasibleness of the programs to be implemented. These quality standards guarantee not only the seriousness of the intervention, but also allow the feedback of reliable information to validate silence practices in specific groups and/or their educational communities.

Silence practices and time possibilities in educational environments

Finally, the last but not least important issue to have in mind from the available literature highlights the real possibility of incorporating silence practices in consideration of usually 'full of activities' learning environments. Time extension in schools has been the subject of a wider public debate. In the United States, Europe and several Latin American countries, reforms have been undertaken that involve increasing class time (MARTINIĆ; VILLALTA, 2015). Actually, children spend a lot of hours in school, with children in Costa Rica, Colombia, and Chile having more than 1000 to 1200 hours of class per year (OECD, 2018). It is hard to think that an educational institution will endorse special time to practice silence for the sake of the practice itself. Although this is a great socioeconomic issue that surpasses the scope of this article, a partial solution may be found in experiences from other programs that had successfully managed to incorporate practices of silence in school settings. Useful examples to be observed are: Stress Reduction and Mindfulness Curriculum; Mindful Moment; Still Quiet Place; Resilient Kids; Mindful Schools; Inner Explorer; Mindfulness in Schools Project [MiSP]; Mindfulness curriculum for 11-18 year old in schools [.b]; The School-Based Meditation Model; Growing with

Mindfulness; The Rite of Silence; and many others (LERÍA DULČIĆ; SALGADO; SASSO, 2019; HUTCHINSON; HUWS; DORJEE, 2018; LERÍA DULČIĆ, 2017). All these programs, with their strengths and weaknesses, show the importance of a multidimensional approach, offering introductory talks, contemplative experiences, individual and group planning guides, theoretical readings, virtual supervision, and many other activities that guarantee a space for practice, participation, and dissemination of their purposes. Furthermore, there are suggestions on the importance of permanent practice over time (LÓPEZ-HERNÁEZ, 2016), stating as the above programs did.

Conclusions: A path yet to be tread

In this paper, we have explored empirical evidence and some ideas about silence practices as a valuable educational strategy, and therefore, relevant to be considered in CBE, and broadly, in any contemporary curriculum. Each of the reviewed ideas can be an object of a detailed analysis for what this article pretends to be a guideline to researchers, educational policy makers, and professionals in the educational field. The recent surge of interest in the relationship between silence practices and their impact on cognitive and socioemotional development has led to the unification of the empirical data, as well as to some relevant thoughts on what education may be able to embrace in the complete and inclusive sense. As it is understood here, the notion of silence, its practices, and the data that emerges from its study allude to a pluralism of dimensions from which the educational system can extract benefits, without necessarily sharing all of its core values. In that pursuit, we remarked the struggle for a more balanced curricular approach, especially in CBE, which tends to diminish an important human experience which is well nurtured by the contemplative approach: the skill of deeply relating with oneself, with silence practices as one of its core strategies.

We agree with the idea that educational systems should be constituted by proposals that are an outgrowth of the society in which they exist, making them a contribution to a corpus of knowledge that opens the way for silence to be systematically used in learning environments, evidence-based, and of practical applicability. Thus, the concluding aim of this paper is to prompt the interest in this important human experience based not only on its impact, but also on the idea that a quiet spot in the usual educational dynamic can converge in a new way to experience the educational project itself, more properly owned by, and at least a bit closer to the classic "Know thyself".

References

BAMBER, Mandy; KRAENZLE, Joanne. Mindfulness-based meditation to decrease stress and anxiety in college students: A narrative synthesis of the research. **Educational Research Review**, Netherlands, v. 18, p. 1-32, 2016.

BARRY, Margaret; CLARKE, Aleisha; DOWLING, Katherine. Promoting social and emotional well-being in schools. **Health Education**, Sydney, v. 117, n. 5, p. 434-451, 2017.

BAUER, Clemens *et al*. From state-to-trait meditation: reconfiguration of central executive and default mode networks. **eNeuro**, Washington, DC, v. 6, n. 6, p. 1-17, 2019.

BIALIK, Maya *et al*. **Character education for the 21st century**: what should students learn? Boston: Center for Curriculum Redesign, 2015.

BORELLI, Eleonora *et al*. The psycholinguistic and affective structure of words conveying pain. **PLoS ONE**, Rome, v. 13, n. 6, p. 1-29, 2018.

CASTRO, Marianella; MORALES, María Esther. Los ambientes de aula que promueven el aprendizaje, desde la perspectiva de los niños y niñas escolares. **Educare**, Heredia, v. 19, n. 3, p. 1-32, 2015.

CHRISTAKIS, Dimitri *et al*. How early media exposure may affect cognitive function: a review of results from observations in humans and experiments in mice. **Proceedings of the National Academy of Sciences**, Washington, DC, v. 115, n. 40, p. 9851-9858, 2018.

COOPER, David; YAP, Keong; BATALHA, Luisa. Mindfulness-based interventions and their effects on emotional clarity: a systematic review and meta-analysis. **Journal of Affective Disorders**, Netherlands, v. 235, p. 265-276, 2018.

COSTELLO, Patricia *et al*. Semantic and subword priming during binocular suppression. **Consciousness and Cognition**, EEUU, v. 18, n. 2, p. 375-382, 2009.

DAHL, Cortland J.; DAVIDSON, Richard J. Mindfulness and the contemplative life: pathways to connection, insight, and purpose. **Current Opinion in Psychology**, United Kingdom, v. 28, p. 60-64, 2018.

DE BARBARO, Kaya; CLACKSON, Kaili; WASS, Sam. Infant Attention Is dynamically modulated with changing arousal levels. **Child Development**, EEUU, v. 88, n. 2, p. 629-639, 2016.

DENG, Yuqin *et al*. The role of mindfulness and self-control in the relationship between mind-wandering and metacognition. **Personality and Individual Differences**, United Kingdom, v. 141, p. 51-56, 2019.

DRAKE, Susan Margaret; REID, Joanne. Integrated curriculum as an effective way to teach 21st century capabilities. **Asia Pacific Journal of Educational Research**, Singapore, v. 1, n. 1, p. 31-50, 2018.

ERGAS, Oren. The post-secular rhetoric of contemplative practice in the curriculum. *In*: WEXLER, Philip; HOTAM, Yotam. **New social foundations for education**: education in post-secular society. New York: Peter Lang, 2015. p. 107-130.

ERGAS, Oren *et al*. Contemplative neuroscience as a gateway to mindfulness: findings from an educationally framed teacher learning program. **Mindfulness**, New York, v. 9, n. 6, p. 1723-1735, 2018.

FEILER, Jacob; STABIO, Maureen. Three pillars of educational neuroscience from three decades of literature. **Trends in Neuroscience and Education**, Alemania, v. 13, p. 17-25, 2018.

FERRER, Jorge; SHERMAN, Jacob. **The participatory turn**: spirituality, mysticism, religious studies. Albany: State University of New York Press, 2009.

FULLER, Caitlyn *et al*. Bedtime use of technology and associated sleep problems in children. **Global Pediatric Health**, Los Angeles, v. 4, p. 1-8, 2017.

GARTENSCHLÄGER, Martin *et al*. Resting brain activity related to dispositional mindfulness: a PET study. **Mindfulness**, New York, v. 8, n. 4, p. 1009-1017, 2017.

GREENBERG, Jonathan *et al.* Reduced interference in working memory following mindfulness training is associated with increases in hippocampal volume. **Brain Imaging and Behaviour**, New York, v. 13, n. 2, p. 366-376, 2018.

HADAR, Linor; ERGAS, Oren. Cultivating mindfulness through technology in higher education: a Buberian perspective. **AI & SOCIETY**, Alemania, p. 1-9, 2018.

HAO, Richie Neil. Rethinking critical pedagogy: implications on silence and silent bodies. **Text and Performance Quarterly**, United Kingdom, v. 31, n. 3, p. 267-284, 2011.

HARTLEY, David. The emergence of blissful thinking in the management of education. **British Journal of Educational Studies**, United Kingdom, v. 67, n. 2, p. 201-216, 2018.

HERNÁNDEZ, Sergio Elías *et al*. Gray matter and functional connectivity in anterior cingulate cortex are associated with the state of mental silence during sahaja yoga meditation. **Neuroscience**, Netherlands, v. 371, p. 395-406, 2018.

HUMPHREYS, Leanne; CRINO, Rocco; WILSON, Ian. The competences movement: origins, limitations, and future directions: the competences movement. **Clinical Psychologist**, EEUU, v. 22, n. 3, p. 290-299, 2017.

HUTCHINSON, Julia; HUWS, Jaci; DORJEE, Dusana. Exploring experiences of children in applying a school-based mindfulness programme to their lives. **Journal of Child and Family Studies**, New York, v. 27, n. 12, p. 3935-3951, 2018.

KEVER, Anne; GRYNBERG, Delphine; VERMEULEN, Nicolas. Congruent bodily arousal promotes the constructive recognition of emotional words. **Consciousness and Cognition**, EEUU, v. 53, p. 81-88, 2017.

KIRSTE, Imke *et al*. Is silence golden? Effects of auditory stimuli and their absence on adult hippocampal neurogenesis. **Brain Structure and Function**, Alemania, v. 220, n. 2, p. 1221-1228, 2013.

KOK, Bethany; SINGER, Tania. Effects of contemplative dyads on engagement and perceived social connectedness over 9 months of mental training: a randomized clinical trial. **JAMA Psychiatry**, EEUU, v. 74, n. 2, p. 126-134, 2017.

KREPLIN, Ute; FARÍAS, Miguel; BRAZIL, Inti. The limited prosocial effects of meditation: a systematic review and meta-analysis. **Sci Rep**, United Kingdom, v. 8, p. 2403, 2018.

LANERI, Davide *et al*. Mindfulness meditation regulates anterior insula activity during empathy for social pain. **Human Brain Mapping**, EEUU, v. 38, n. 8, p. 4034-4046, 2017.

LARSEN, Peter. The sound of silence is music to the heart. **Heart**, United Kingdom, v. 92, n. 4, p. 433-434, 2005.

LECLERC, Remi; HORAN, Roy. "Fit" for change: measuring designer competence. **International Journal of Design Creativity and Innovation**, United Kingdom, v. 6, n. 3-4, p. 185-210, 2017.

LERÍA DULČIĆ, Francisco José. Incorporation of the contemplative orientation in the educational practice of the 21st century. **Reice**, Madrid, v. 15, n. 4, p. 67-85, 2017.

LERÍA DULČIĆ, Francisco José. Strengthening initial professional education in preschool teachers: contemplative program "The Rite of Silence". **Aulas de Encuentro**, Jaén, v. 21, n. 1, p. 1-16, 2019. (in press).

LERÍA DULČIĆ, Francisco José; SALGADO ROA, Jorge Alejandro; SASSO ORELLANA, Patricia Ester. Sentido subjetivo de educadoras de párvulos en el uso e impacto del silencio en el aprendizaje. **Reice**, Madrid, v. 16, n. 2, p. 77-97, 2018.

LEYLAND, Anna; ROWSE, Georgina; EMERSON, Lisa-Marie. Experimental effects of mindfulness inductions on self-regulation: systematic review and meta-analysis. **Emotion**, Sheffield, v. 19, n. 1, p. 108-122, 2019.

LÓPEZ-HERNÁEZ, Lara. Mindfulness techniques in the schools. Academic and personal development of its participants. **REOP**, Madrid, v. 27, n. 1, p. 134-146, 2016.

LUBERTO, Christina *et al*. A systematic review and meta-analysis of the effects of meditation on empathy, compassion, and prosocial behaviors. **Mindfulness**, New York, v. 9, n. 3, p. 708-724, 2017.

LUDERS, Eileen; THOMPSON, Paul; KURTH, Florian. Larger hippocampal dimensions in meditation practitioners: differential effects in women and men. **Frontiers in Psychology**, Lausanne, v. 6, n. 186, p. 1-6, 2015.

MAK, Catherine *et al*. Efficacy of mindfulness-based interventions for attention and executive function in children and adolescents: a systematic review. **Mindfulness**, New York, v. 9, n. 1, p. 59-78, 2017.

MARTINIĆ, Sergio; VILLALTA, Marco. La gestión del tiempo en la sala de clases y los rendimientos escolares en escuelas con jornada completa en Chile. **Perfiles Educativos**, Ciudad de México, v. 37, n. 147, p. 28-49, 2015.

MARUSAK, Hilary *et al*. Mindfulness and dynamic functional neural connectivity in children and adolescents. **Behavioural Brain Research**, Netherlands, v. 336, p. 211-218, 2018.

MEIKLEJOHN, John *et al*. Integrating mindfulness training into K-12 education: fostering the resilience of teachers and students. **Mindfulness**, New York, v. 3, p. 291-307, 2012.

MEISTER, Hartmut *et al*. Verbal response times as a potential indicator of cognitive load during conventional speech audiometry with matrix sentences. **Trends in Hearing**, v. 22, n. 233121651879325, p. 1-11, 2018.

MENÉNDEZ ÁLVAREZ-HEVIA, David. Critical approach to emotional intelligence as a dominant discourse in the field of education. **Revista Española de Pedagogía**, Madrid, v. 76, n. 269, p. 7-23, 2018.

MONTERO-MARÍN, Jesús *et al*. Psychological effects of a 1-month meditation retreat on experienced meditators: the role of non-attachment. **Frontiers in Psychology**, Lausanne, v. 7, n. 1935, p. 1-11, 2016.

OBERLE, Eva; SCHONERT-REICHL, Kimberly. Stress contagion in the classroom? The link between classroom teacher burnout and morning cortisol in elementary school students. **Social Science & Medicine**, United Kingdom, v. 159, p. 30-37, 2016.

OBERLE, Eva; SCHONERT-REICHL, Kimberly. Social and emotional learning: recent research and practical strategies for promoting children's social and emotional competence in schools. *In:* MATSON, Johnny. **Handbook of social behavior and skills in children**. Cham: Springer, 2017. p. 175-198.

OECD - Organisation for Economic Co-operation and Development. **Teaching hours**. [S. l.], OECD, 2018. Available from: https://data.oecd.org/teachers/teaching-hours.htm. Access *in:* 7 Jan. 2019.

ORIOL, Xavier *et al*. The role of self-control and grit in domains of school success in students of primary and secondary school. **Frontiers in Psychology**, Lausanne, v. 8, p. 1-9, 2017.

PAYMAL, Noemi. **Pedagooogía 3000**: una pedagogía para el tercer milenio. La Paz: Ox La-Hun, 2014.

PEGALAJAR PALOMINO, María del Carmen. Formación en competencias en alumnado universitario mediante prácticas basadas en aprendizaje cooperativo. **Revista Complutense de Educación**, Madrid, v. 29, n. 3, p. 35-52, 2018.

PRZYREMBEL, Marisa; SINGER, Tania. Experiencing meditation: evidence for differential effects of three contemplative mental practices in micro-phenomenological interviews. **Consciousness and Cognition**, EEUU, v. 62, p. 82-101, 2018.

PÜTZ, Peter *et al*. Duration discrimination in the context of age, sex, and cognition. **Journal of Cognitive Psychology**, United Kingdom, v. 24, n. 8, p. 893-900, 2012.

ROBINSON, Michael; EID, Michael. **The happy mind**: cognitive contributions to well-being. Cham: Springer, 2017.

SALE, Alessandro. Systematic look at environmental modulation and its impact in brain development. **Trends in Neurosciences**, Cambridge, v. 41, n. 1, p. 4-17, 2018.

SCARPA, Angela. Physiological arousal and its dysregulation in child maladjustment. **Current Directions in Psychological Science**, Washington, DC, v. 24, n. 5, p. 345-351, 2015.

SCOTT, Cynthia L. **The futures of learning 3:** what kind of pedagogies for the 21st century? Paris: Unesco Education Research and Foresight, 2015. Available from: https://unesdoc.unesco.org/ark:/48223/pf0000243126. Access on: 13 Mar. 2019.

SEMPLE, Randye; DROUTMAN, Vita; REID, Brittany Ann. Mindfulness goes to school: things learned (so far) from research and real-world experiences. **Psychology in the Schools**, Muncie, v. 54, n. 1, p. 29-52, 2016.

SHUEY, Elizabeth *et al*. "Curriculum alignment and progression between early childhood education and care and primary school: A brief review and case studies". **OECD Education Working Papers**, Paris, v. 193, 9. 1-93, 2019.

SHUTE, Rosalyn. Schools, mindfulness, and metacognition: a view from developmental psychology. **International Journal of School & Educational Psychology,** Amsterdam, v. 7, n. 1, p. 1-14, 2018.

TAHSINI, Gholami Z. *et al*. Biofeedback-aided relaxation training helps emotional disturbances in undergraduate students before examination. **Applied Psychophysiology and Biofeedback**, EEUU, v. 42, n. 4, p. 299-307, 2017.

TAMAKOSHI, Seiji *et al*. Entire sound representations are time-compressed in sensory memory: evidence from MMN. **Frontiers in Neuroscience**, Netherlands, v. 10, n. 347, p. 1-7, 2016.

THE TREE of contemplative practices. [S. l.], 15 July 2000. Available from: http://www.contemplativemind.org/practices/tree. Access on: 20 Dec. 2018.

THOMAS, Michael; ANSARI, Daniel; KNOWLAND, Victoria. Annual research review: educational neuroscience: progress and prospects. **Journal of Child Psychology and Psychiatry**, United Kingdom, v. 60, n. 4, p. 477-492, 2019.

TONIOLO-BARRIOS, Mariana; BRASIL, Alexander; PITT, Leyland, F. Nine prolific years: an analysis of publications in mindfulness. **Mindfulness**, Switzerland, v. 11, n. 3, p. 1-13, 2020.

TRAN, Bach Xuan *et al*. Global mapping of interventions to improve quality of life using mind-body therapies during 1990-2018. **Complementary Therapies in Medicine**, Churchill Livingstone, v. 49, n. 102350, p. 1-8, 2020.

VIGLAS, Melanie; PERLMAN, Michal. Effects of a mindfulness-based program on young children's self-regulation, prosocial behaviour and hyperactivity. **Journal of Child and Family Studies**, EEUU, v. 27, n. 4, p. 1150-1161, 2017.

VON DER HEIDE, Rebeca; VYAS, Govinda; OLSON, Ingrid. The social network-network: size is predicted by brain structure and function in the amygdala and paralimbic regions. **Social cognitive and affective neuroscience**, Los Angeles, v. 9, n. 12, p. 1962-72, 2014.

WATERS, Lea *et al*. Contemplative education: a systematic, evidence-based review of the effect of meditation interventions in schools. **Educational Psychology Review**, Dordrecht, v. 27, p. 103-134, 2014.

WEARE, Katherine. Mindfulness and contemplative approaches in education. **Current Opinion in Psychology**, United Kingdom, v. 28, p. 321-326, 2019.

WITTMANN, Marc; SCHMIDT, Stefan. Mindfulness meditation and the experience of time. studies in neuroscience. *In:* SCHMIDT, Stefan; WALACH, Harald. **Meditation**: neuroscientific approaches and philosophical implications. New York: Springer, 2014. p. 199-211.

WU, Jinting; WENNING, Mario. The postsecular turn in education: lessons from the mindfulness movement and the revival of confucian academies. **Studies in Philosophy and Education**, Netherlands, v. 35, n. 6, p. 551-571, 2016.

ZAJONC, Arthur. Contemplative pedagogy: a quiet revolution in higher education. **New Directions for Teaching and Learning**, United Kingdom, v. 134, p. 83-94, 2013.

ZENNER, Charlotte; HERRNLEBEN, Solveig; WALACH, Harald. Mindfulness-based interventions in schools: a systematic review and meta-analysis. **Frontiers in Psychology**, Lausanne, v. 5, n. 603, p. 1-20, 2014.

ZERMEÑO, Ana María; LOZANO-Rodríguez, Armando. Desarrollo de competencias interpersonales en ambientes virtuales. **CPU-e Revista de Investigación Educativa**, Veracruz, v. 22, p. 176-199, 2016.

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