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Message from the Desk of Editor

The International Journal of Indian Psychology gives emphasis to the development and retaining of outstanding people. It empowers people to maximize their potential contribution and encourage them to be entrepreneurial. Quality Control - By implementing the strong quality measures & amp; intellectual property law; the journal is eager to develop the strong coordination with researchers, academics & industrial practitioners. Innovation - Being a high energy, fast moving, decisive organization with a strong tendency for action; International Journal of Indian Psychology is constantly looking for new ideas & suggestions.

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Currently, the journal's Achievement is becoming a major international research journal editors and thesis research. We acquire, develop, market and distribute the knowledge through the dissemination of academics and practitioners from around the world. The journal published by maintains the highest standards of quality, integrated newsrooms by researchers around the world.

At last, I would like to thank *RED'SHINE Publication, Pvt. Ltd*. for this keepsake, and my editorial team, technical team, designing team, promoting team, indexing team, authors and well wishers, who are promoting this journal. As well as I also thankful to *Indian Psychological Association* and President *Prof. Tarni Jee* for gives review team, I also thank you to all Indian Psychological Association members for support us. With these words, I conclude and promise that the standards policies will be maintained. We hope that the research featured here sets up many new milestones. I look forward to make this endeavour very meaningful.

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ABSTRACT

In this paper Dr Albert Ferrer examines three fields of neuroscientific research that have already affected or may affect in the future the educational arena. In parallel to that, some of these neuroscientific findings are deepening the philosophical questioning of modern materialism and mechanism. These three fields of research are: educational, aesthetic and spiritual neuroscience. The author shows that educational neuroscience may be useful to debunk groundless fashions and corroborate on scientific grounds important pedagogic principles. However, educational neuroscience can hardly out forward any new fantastic theories after thousands of years of behavioural observation of children and educational practice and philosophy. It can also be useful in more technical matters such as diagnosis of neural disorders. Aesthetic and spiritual neuroscience can even be more important in front of the reductionistic mainstream school model with their defence of the role of art and even spirituality in the educational process, something that philosophers of education had already advocated centuries back. Therefore, the empirical findings of these three branches of neuroscience can be very valuable in order to unmask the fallacies of modern materialism and mechanism and open new avenues towards a paradigm shift. Nonetheless, in mainstream scholarship and culture they have often been used –or misused- to legitimate the technocratic mirage of the modern world.

Keywords: *Neuroscience, Educational neuroscience, Aesthetic neuroscience, Spiritual neuroscience, Educational psychology, Philosophy of science, Philosophy of education*

World-famous scientists, such as F. Capra, have expressed their concern about the importance and urgency for mankind to wake up and face the present catastrophe produced by the prevailing materialistic and mechanistic world view.[1] He is one of the numerous scientists to advocate a radical paradigm shift that is likely to result in a transformation of unprecedented dimensions, a turning point in the history of humanity on Earth. Capra insists that **we need a new vision of reality, from the past mechanism to a new holistic world view. Neuroscientific findings can definitely support this paradigm shift –**as we will examine below-.

- This new world view will be essentially multi-dimensional; one of the major fallacies of the age of mechanism has been its inherent reductionism: reducing reality to less dimensions –only the material/ intellectual realms-. But, as Albert Einstein warned, we cannot solve a problem with the state of mind that has created it. Therefore, we can only apprehend a holistic paradigm with a holistic mind; we can only explore a multi-dimensional cosmos with a multi-dimensional mindset.
- Mechanistic physics was transformed into a paradigm by Industrial Revolution and capitalistic expansion; this mechanistic world view basically resulted in a world of machines. The dawn of a new holistic paradigm will certainly witness new

[1] Cf - CAPRA F., "The Tao of Physics", Shambhala, Boston, 1975

technologies, but this will be tributary to a main psychological revolution, a profound transformation of the human psyche –as beautifully forecasted by the eminent sage of the XXth century, J. Krishnamurti.

- This new holistic world view will integrate what mechanism separated: science and spirituality –not outer dogmas but the inner dimension- together with philosophy, psychology and even the arts: a new unifying theory of knowledge that will be federalistic in nature and essentially relational and dialectical –like reality itself, that implies interconnectedness and interdependence-. The age of mechanism lost the unity of life and hence produced a new alienation never seen before. A new paradigm, inseparable from a new state of consciousness, will recover the forgotten unity and plenitude of life.

Philosophical Idealism and spiritual philosophy already discovered multiple dimensions thousands of years back –at the astonishment of the forerunners of quantum physics, who opened the door to a multidimensional cosmos in physics-. The multidimensional and holistic world view of quantum physics and new science –in dialogue with philosophy and other disciplines- will open unexpected avenues for humanity. Neuroscience has made astonishing discoveries that corroborate this new world view.

Some authors, such as Ortoli and Pharabod, have underlined that quantum physics contains the seeds of a gigantic cultural revolution ahead. Most of the scientists working in quantum science today acknowledge that, beyond the pure scientific/ experimental method, quantum physics and new science foster a radical paradigm shift. Quite obviously, as a paradigm, that is, a world view, it will go far beyond the strict limits of the scientific method encompassing all aspects of human civilization. We should not mistake the underlying paradigm for the scientific discipline that can inspire it –in dialogue with other disciplines-.

Few are still aware today of the tremendous scope of this quantum revolution, which is to some extent the only true revolution, in front of which communist revolutions would be pure “maya” (illusion). This profound revolutionary character of quantum science resides precisely in its major conclusions, which, at the threshold of philosophy, converge with the major statements of Philosophical Idealism and spiritual philosophy –both Eastern and Western, and in particular Indian philosophy-. It is meaningful enough that the forerunners of quantum physics were aware of this crucial parallelism; one of the greatest physicists of the XXth century, Einstein, totally agreed with some of these major conclusions, among which, the capital role of consciousness and the urgent need for a shift in the human psyche.

Materialistic mechanism is still predominant in social terms, and the historical inertia seems to be too heavy to witness faster changes. But this old paradigm from Industrial Revolution is unsustainable and has no future ahead; we cannot deny it anymore. The future of humanity on Earth depends on our capacity to open eyes, awaken and make the change –in ourselves and hence outside-. In the horizon of this paradigm shift, education becomes the most fundamental issue.

Just as the mainstream school system was the pedagogy of Industrial Revolution and a world of factories, integral value-based education will be the pedagogy of this new holistic world view. The new emerging paradigm outlines a multidimensional and interdependent cosmos – just as integral education, that proposes a multidimensional pedagogy where all the domains of humanity and hence pedagogy are interconnected-.
In our own scholarly work we try to present a sound theory for integral value education in the line of this paradigm shift, in the historical convergence between science and spirituality, quantum physics and Philosophical Idealism, new science and spiritual philosophy.

In the horizon of this consciousness and paradigm shift, educational, aesthetic and spiritual neuroscience can bring a decisive contribution to help people -and in particular scholars- to open eyes, realize the fallacies of modern materialism/ mechanism and disclose the principles of a new world view that will be more human, sustainable and fair.

Quite obviously, the findings of neuroscience have often been used –or misused- in the opposite direction, to blindly endorse the old materialistic views that were not sustainable anymore; the fact is that the evidence has been put forward by neuroscience showing that the basic tenets of a materialistic civilization were fallacious.

Let us examine it below in more detail, while we also discuss the contribution of neuroscience towards an educational shift parallel to a paradigm shift.

From neuroscience to wisdom; technocracy and humanism.
There has been a fashion in the last decades about educational neuroscience, falling into the technocratic mirage –once more- presuming that "science" has the key to the human condition and reality, and hence education.

Quantum physicists have turned their attention to the traditions of spiritual philosophy and wisdom, and have concluded that consciousness is the key.
As both Indian and Greek culture emphasized: philosophy is more important than science, because (true) philosophy precisely deals with the secret of consciousness, which goes beyond the frontiers of proper science.

- **Aesthetic and spiritual neuroscience** have produced enthralling research that manifests on scientific grounds the capital role of the arts –aesthetics- and spirituality/ meditation.
  In fact, many neuroscientists from these fields of research have corroborated the conclusions of both quantum physicists and mystics.
- **Educational neuroscience** can also be helpful and valuable by showing what happens in the brain through the learning process –just as **spiritual neuroscience** observes what happens in meditation and **aesthetic neuroscience** describes what occurs through the aesthetic experience-.

- But spiritual neuroscience cannot tell us how to meditate or what is spirituality, and aesthetic neuroscience cannot tell us how to create artistically or what is art. Similarly, educational neuroscience cannot tell us how to educate or what is education. To pretend it is epistemologically false; it presumes an extrapolation that is not valid.

First of all, serious neuroscientists warn that the results of educational neuroscience can only be utilized through educational psychology and educational philosophy. Neuroscience cannot overlook a whole discipline with scientific foundations such as educational psychology. It cannot invalidate either the issue of the world view and the role of educational philosophy; consciousness is the key, and consciousness cannot be reduced to the brain at all –as many quantum physicists and neuroscientists have stressed-.

Moreover, as Kant warned, education is a historical process based on the observation, experience and wisdom of many generations through centuries. Montessori or Piaget's invaluable contributions are based upon empirical observation –evidence-based- and are valid though prior to neuroscience.

Neither neuroscience nor science can answer to the question: What is the purpose of education? Which values do we teach? These are philosophical issues, and it is a matter of conscience.

Even "How we teach?" cannot get rid of psychology, philosophy and this Kantian concern for learning from history through practice and experience.
Finally, any pedagogy lies upon a world view and a set of values –consciously or not- and this is not a scientific matter but a philosophical issue.

What can educational neuroscience tell us?

- Neuroscience can tell us how the brain works –in a meditative state, in an aesthetic experience or in the ordinary learning process-.
- It can help to debunk groundless fashions such as "learning styles" –which is totally different from something much more serious, "multiple intelligences"-.
- Neuroscience has questioned another pedagogic ideology –the global way of learning to read and write- showing that the traditional analytical method was better. Even ministries of education fell into the mirage and ignored neuroscience.
- Ultimately, neuroscience can describe how the learning process occurs, which should be taken into account by the educational system. However, neuroscience will only confirm –scientifically- what was already observed by sensible educators through the pedagogic practice long time back.
- Mainstream schooling teaches children to write and learn mathematical tables in kindergarten when it is premature, when the brain is not ready yet for such abstractions. Children spend years struggling with it, and this pedagogic aberration produces more dyslexia than ever. Finally the brain catches up and it becomes easier. In both cases –

alphabet and tables- the child is forced to learn something prematurely when the brain is not ready for that abstraction; the brain is forced to deal with something without intermediate steps, which creates barriers and blocks. From scans on the brain, neuroscience would suggest that it is better to teach writing and tables at the age of six to seven when the human growth is ready for it. Then, what other children in mainstream schools would take several years to learn, children at 6/ 7 pick up in several months because the brain is ready for those skills. By the way, R. Steiner knew all this very well and proposed it without any neuroscience yet.

- When children are forced to study for a long time, they are full up and cannot take anymore; neuroscience shows that this is very real. A sensible educational system must allow children to stop and go out and play from time to time.
- When we first learn something new, the information goes into the temporary memory; when we stop learning and go out and play, the brain starts organizing the materials from the temporary memory and puts them into the permanent. The real learning occurs not in the classroom but in the garden. Neuroscience scans will advise teachers not to pressurize children for too long but respect the way how the brain works. Again, this was realized by some educators long time back; neuroscience will only provide a modern scientific verification.
- When we make children follow successive subjects through short periods without breaks –as in mainstream schooling-, the materials from the previous period that are kept in the temporary memory are replaced by the information from the second period and erased, because there was no break to allow the passage from the temporary to the permanent memory -and so on through all the periods of the day-. That is why ancient pedagogies followed the same subject for longer periods of time while allowing prudent breaks and hence assimilation. This overload of information becomes even worse with the flickering screen of the television, changing images every few seconds, hyper-stimulating and hypnotizing the brain.
- Neuroscience confirms that education must allow the child to I. absorb, II. assimilate, meditate on it, experience it, and then, III. re-express in its own way. The educational system must give enough time to complete the loop and operate the whole process, which the mechanical succession of short periods without breaks will never allow. We must extend the duration of the class and bring in these three steps. Then, students can learn more efficiently in less real time; mainstream schooling wastes so much time in erasing layers of information.
- Integral spiritually-based education constitutes the underlying paradigm for this kind of learning experience suggested by educational neuroscience –and already practised by ancient pedagogies-. Through Philosophical Idealism, everything naturally falls into place. From the vision of the child as a soul in evolution, already having everything within, the educational process is seen as unfolding from within; then the three steps of the learning experience emerge spontaneously and can be easily implemented in the school.
- Ultimately, what is the foundation for the educational process? Neuroscience or educational philosophy, science or philosophy? Here we dare to say that the foundation

> for integral education -or just education- will never be science but philosophy. This constitutes the major challenge for the present technocratic civilization: to shift from scientism to humanism –within which genuine science will always keep its role, but not more than its proper role-.

In conclusion, neuroscience cannot get rid of the philosophical foundation or the psychological dimension of education, and needless to say, it can never replace the real pedagogic experience –with the whole historical background, accumulated experience and treasures of wisdom-.

Technocracy has discarded conscience and buried wisdom. Here we make a philosophical proposal from technocracy to a new humanism.

This has nothing to do with science; it is an ethical decision –being aware that technocracy is an ideology, a nefarious and fallacious ideology that has fed all the evils of this world while alienating humanity more than ever.

A MORE DETAILED EXAMINATION OF EDUCATIONAL NEUROSCIENCE.[2]

First of all, we must be aware that cognitive/ educational neuroscience will be cut from the real pedagogic practice as mere theoretical research unless adequate ways are found to translate the findings of neuroscience into practical, comprehensible and useful tips for the classroom life and teachers -who are already overwhelmed by all the factors straining the daily routine and leaving virtually no time for theoretical inquiry-.

Moreover, there is always a gap in education between the theory and the practice; the theory may be beautiful and it may get neuroscientific evidence, but the practice is not so easy because learners are not machines but complex/ multidimensional human beings, and the human factor always surpasses any theory or scientific finding.

To start with, educational neuroscience must be intimately twinned to psychology of education, pedagogy and philosophy of education –even sociology and history of education/ anthropology in an intercultural perspective-.[3]

The confluence of these basic disciplines will help us to design adequate educational models with the needed school organization, pedagogic principles and tools. These models –which

[2] Cf, for instance, Fride Roe Flobakk, "Educational Neuroscience. A Critical Discourse Analysis", thesis, Norwegian University of Science and Technology, Trondheim, 2011.
Cf also Howard Jones P., "Introducing Neuroeducational Research. Neuroscience, Education and the Brain from Contexts to Practice", Routlege, London, 2009.)
(Cf Butterworth, Mareschal, Tolmie, ed., "Educational Neuroscience", Wiley-Blackwell, Hoboken (NJ), 2013.

[3] Cf, for instance, J.T. Bruer, "Where is Educational Neuroscience?", "Educational Neuroscience", vol. I, 1-12, SAGE.
Cf Dundar, Ayvaz, "From Cognitive to Educational Neuroscience", "International Education Studies", vol. 9, no 9, 2016.

will be theoretical- must be brought to the daily life of the classroom and hence to teachers –and parents- in pragmatic, definite, clear ways that can be really put into motion while taking into account the whole reality of the complex school life and classroom practice far beyond elegant scientifically grounded theoretical models. Any theory can easily collapse in real life with the unpredictable human factor of students -quite often stressed- and teachers -quite often depressed-. When confronted to great scientific findings and awesome theoretical models many teachers just respond from the real daily life of the classroom: -Come here and do it, try yourself.

We live in a technocratic civilization, and both neuroscientists –or scholars in general- and ministries of education may fall into the mirage of scientism and bureaucracy. Ministry inspectors step into the school with all their schemes and norms, but if they enter the real classroom with real human beings they will realize that it is more complex. Neuroscientists may inform educators about their wonderful findings, but again they can join in the classroom and see by themselves what they can do with all their findings in the midst of the real boys and girls and the real teachers with all their complexities, problems, worries, etc.
Cognitive and educational neuroscience should bring their inputs into sound educational models in collaboration with psychology of education, pedagogy, educational philosophy and still other disciplines, and then the transdisciplinary educational model with its pedagogic principles and tools should find pragmatic and flexible strategies to really enhance the pedagogic practice of the classrooms in ways that can be assumed by the teachers and that can benefit the students -who are already embedded in the practical difficulties of daily life-.
This will be a historical process that will be at the same time the process of the whole civilization. We cannot change education without changing the society, because reality is interdependent, and we cannot change the society if human beings do not change –through education-. Reality is dialectical, and false illusions will not work; as Kant warned, this is the historical process of humanity towards emancipation.[4]

The collective article "Forging a New Path for Educational Neuroscience: An International Young Researcher Perspective on Combining Neuroscience and Educational Practices" ("Trends in Neuroscience and Education", 3/ 2014) offers some suggestions to translate educational neuroscience into the real pedagogic practice in pragmatic ways.[5]

In "Educational Neurosciences: More Problems than Promise?" ("Education Policy Research Series", Discussion Document no 3, UNESCO Bangkok) Ilkka Tuomi recognizes that there has been an abundant flow of new research in the field of cognitive and educational neuroscience, which has nurtured a great interest in the possibility to enhance the educational

[4] Cf Trimble M.R., "The Soul in the Brain. The Cerebral Basis of Language, Art and Belief", The Johns Hopkins University Press, 2007.
Cf Walach H., ed., "Neuroscience, Consciousness and Spirituality", Springer, New York, 2011.
[5] Cf also Sousa D.A., "Mind, Brain and Education. Neuroscience Implications for the Classroom", Solution Tree, Bloomington (IN), 2010.

practice from these scientific findings. This new path of implementation has sometimes been called **"brain-based education".**

However, blind scientism in a technocratic civilization does not make the distinction between science and ideology, since technocracy-biased scientists or administrators do not realize that the very concept of "brain-based education" is not a scientific finding but rather an ideological concept that fallaciously pretends to be grounded in scientific research.

Any mystic could call for **"soul-based education"** with neuroscientific grounds, since spiritual neuroscience has put forward enough evidence to conclude that the spiritual state does exist and positively affects the psyche and the body.
Quantum scientists and philosophers could also defend the concept of **"consciousness-based education"**, since consciousness cannot be reduced to the brain and constitutes the key to everything according to both quantum physics and Philosophical Idealism.

Therefore, instead of the prevailing materialism, mechanism, scientism and technocracy, we could make the case for another world view, a quantum paradigm that is also ethical, philosophical, holistic and humanistic, making it clear that it is not only scholarly legitimate but also scientifically grounded.[6]

Ilkka Tuomi makes a crucial distinction between **"brain-informed" and "brain-based" theories of learning.**

Brain-informed theories may bring valuable inputs together with psychology, pedagogy, philosophy, etc, into realistic models that, as Kant stressed, should never overlook the accumulated experience of human history.

Brain-based theories will fall into the technocratic mirage –which is an ideology- pretending to provide the ultimate "scientific" foundation for pedagogic theory and practice. This would be a reductionistic form of scientism that is fallacious as both relational theory -R. Rosen- and quantum physics have clearly evidenced.

Ilkka Tuomi also questions the mechanistic tenets through the scientific evidence showing that the brain is not a computer, nor a machine, something that quantum scientists have repeatedly emphasized. Furthermore, no human being can be reduced to the brain; humanity is something much more complex and profound, which means that the transdisciplinary convergence stated above is crucially needed.

Therefore, it is a technocratic ideology and fallacy to pretend that neuroscience will bring the foundation for new educational practices. It can only bring its findings into this transdiciplinary approach where all the disciplines must contribute: neuroscience,

[6] Cf Newberg A., Waldman M.R., "How God Changes our Brain", Ballantine Books, New York, 2009.

psychology, pedagogy, philosophy, and even history, anthropology and sociology. Reality is complex, interdependent and dialectical. Reductionistic scientism is a fallacious ideology. This dialectical interdependence of reality becomes obvious with neural plasticity: the brain is not a mere repository for knowledge, because the learning process also shapes the brain, thus changing the possibilities for further learning.

Let us see now which are the main inputs that educational neuroscience has brought into the educational arena within this transdisciplinary framework tempered by philosophical warnings.

- To start with, educational neuroscience can be very useful **to debunk a number of "neuromyths"** popularized by the media and some pedagogic fashions –even by Ministries of Education- from misconceptions and lack of information.
- Neuroscience has also realized that nurturing is crucial to the learning process which puts forward the importance of **appropriate learning environments**. Great idea that was already very much present in India in the Ancient times. Some neuroscientific papers have "proved" that **playing is highly positive for children,** which our grandmothers already knew very well, and Rousseau, Pestalozzi and Froebel defended two centuries back. From our research on neuroscience we dare to conclude that educational neuroscience will not really bring new fantastic discoveries for the educational process, because an evolving humanity has observed its children for millions of years and practised education since the dawn of the Homo Sapiens Sapiens and even before.
- The role of neuroscience can be better understood in terms of discarding fallacious theories and corroborating adequate ones –in dialogue with other disciplines-, but it is arrogant and foolish to pretend that after thousands of years of education there is something really new to invent, when the highest philosophers and sages have already said through centuries the most important things from this millenary observation and practice.
- Rather than inventing fantastic new theories –that have been often groundless and catastrophic, like the global ways of learning or the personal learning styles- what we can do within this new transdisciplinary framework is something less ambitious or revolutionary but much more important and urgently needed: to clarify the educational map and organize it better, debunking false myths or groundless fashions and confirming adequate pedagogic strategies that must still be adequately modelled to be effective in the real school scenario.
- *Prof J. Bowers, from the School of Experimental Psychology, University of Bristol, has been arguing that educational neuroscience only tells us what we know already, therefore, neuroscience does not really help to improve pedagogic practice.*
- *According to "Neuroscience: Implications for Education and Lifelong Learning" (The Royal Society, London, February 2011, p. 6):*
- "Just as athletes need to train their muscles, there are many skills where training needs to be continued to maintain brain changes."

- For instance, neuroscience has evidenced that the famous **Mozart Effect** is very real but really acts on the long term upon **repeated practice**. Any musician centuries back would know it. The Vedic masters centuries back were also aware of it. Neuroscience is not discovering anything new; it provides an empirical confirmation of what educators already realized for centuries from empirical observation and practice. Then it can be very useful to counterbalance foolish trends that would deny this accumulated experience through history.
- Neuroscience has also confirmed **the need for breaks** within the educational process allowing the assimilation phase to take place, just as it happens when we **sleep**. Neuroscience has also made it crystal clear that sleep plays a crucial role in learning – whereas the Asian school systems do not provide enough sleep to students who are over-pressurized with aberrant schedules-.
- As the physician and neuroscientist, Judy Willis, has shown, **brain breaks** mobilize different networks of the brain allowing those regions that are blocked by stress or high-intensity work to revitalize. In plain terms, brain breaks allow students to refocus and restore their batteries.
- Any sensible educator would know it from pure experience, but neuroscience can empirically "prove" it for any sceptic, or even more important, it can state it in front of the academic over-pressure that many students suffer in mainstream schooling without any educational authority reacting to it; this would be especially dramatic in Asian school systems.
- Neuroscience can also bring valuable insights to better understand the phenomenon called **"dyslexia"** and hence inform adequate pedagogic practices within the needed transdisciplinary framework. Recent imaging studies have corroborated earlier behavioural observation concluding that dyslexic children or individuals present structural and functional differences in their brains compared to persons with average reading and writing skills.
- However, the practical solutions that may be suggested from neuroscience have already been practised for centuries by sensible educators or parents that had simply observed their children. As usual, the adequate tools for dyslexic children seem to be equally good for average children. We must simply show in clear ways to dyslexic children the correspondence between what we write and what we pronounce syllable by syllable while we make them aware of all the irregularities –so many in English- that do not have any rational explanation. Neuroscience will provide scientific grounds to re-affirm the traditional analytical method and debunk the recent fashion of global ways of learning.
- In general terms, neuroscience can be useful **to identify the brain basis of learning difficulties or disorders.** From appropriate diagnosis, suitable intervention can be designed. Then adaptive programmes can be implemented that constantly shift to suit current learner understanding.[7]

[7] Cf "Neuroscience: Implications for Education and Lifelong Learning", The Royal Society, London, February 2011, p. 10-14.

- Furthermore, neuroscience may confirm what many educators knew from years of practice in the classroom, that **there are individual differences in learning ability with a basis in the brain –not in social context, etc-.**
- Therefore, political or ideological arguments pretending a factual universal equality can be scientifically debunked while enhancing child-centred strategies as advocated by integral education. Children –and all human beings- are not factually equal, they are different, and the educational process must acknowledge and wisely work out these differences for the sake of each individual.
- Education is a universal right, but it cannot be standardized; it must be wisely adapted to each and everyone.
- Once again, neuroscience will not make any extraordinary discovery; it will debunk fallacious demagogy, void trends or artificial political ideologies that have nothing to do with the reality of the educational arena. Once more, neuroscience may confirm the accumulated wisdom of humanity after thousands of years of observation and practice.
- The problems education faces today are often related to groundless fashions or political ideologies that have nothing to do with the real life of the classrooms and the real experience of the educational process. Here neuroscience can be very useful to stop all the trendy foolishness and political demagogy and confirm –on scientific grounds- the lost common sense and the repository of accumulated experience in pedagogy.
- Neuroscience has underlined **the importance of emotions in learning.**[8]
- Once more, nothing new to any sensible educator; humanity has been knowing it for thousands of years.
- But the neuroscientific findings can be extremely useful in front of technocratic prejudice to question the mechanistic or even robotic dimension of modern mainstream schooling. If we use Rousseau's name nobody will listen; if we quote any Indian spiritual master we will be scorned. But when we bring neuroscientific evidence nobody will dare to deny it.
- Education cannot be a mechanistic/ robotic process; children and human beings are inherently emotional, and the human being is a multi-dimensional integrated reality, where emotions certainly play a crucial role and cannot be dissociated form the pure learning process.
- "A common theme in brain research is that superior cognitive input to the executive function networks is more likely when stress is low and learning experiences are relevant to students."
- *The physician and neuroscientist, J. Willis, writes these meaningful lines in "The Neuroscience of Joyful Education" ("Educational Leadership", vol. 64, Summer*

[8] Cf, for instance, "Mind, Brain and Education: Implications for Educators", "Learning Landscapes", vol. 5, no 1, Autumn 2011 p. 9.
Cf Panksepp J., "Affective Neuroscience. The Foundations of Human and Animal Emotions", Oxford University Press, 1998.

2007) to provide neuroscientific grounds for **a humanistic kind of education beyond fear.** Rousseau or Steiner had already advocated this "joyful education", but only neuroscience can defend it before Ministries of Education.

- Neuroscience has also recognized **the critical role of movement and exercise in learning and memory.** Movement and exercise enhance cognitive processing.
- This means that modern schooling forcing children to passively sit for hours and hours is aberrant. Rousseau, Pestalozzi, Froebel, Montessori and Steiner already said that, but no Ministry of Education would listen to them; they will listen to neuroscientists.
- Neuroscience has suggested that **arts develop the brain and enhance cognitive processing.**
- Once more, Steiner defended it and implemented it through Waldorf Schools, but he has been despised by mainstream trends; however, mainstream schooling cannot despise neuroscience. (We fully develop this issue when we examine aesthetic neuroscience together with spiritual neuroscience.)
- Neuroscience has also shown that **the spiritual or meditative state does exist while meditation produces positive effects on the brain and the whole organism.**
- Again, any guru in India would know that, Vedic sages studied it in the Ancient times, but modern Ministries of Education would never listen to the wisdom of India, whereas they must listen to neuroscience.[9]
- Neuroscience has also been very useful to clarify **the distinction between short-term memory** (also known as **working memory**) **and long-term memory.**
- In this context, neuroscience has realized that making multiple interrelationships brings better academic results.

Last but not least: **from "bell schedule" to "block schedule".**

The school system organized around 45-minutes class periods has already been questioned. The **"bell schedule"** of mainstream schooling was compared to a factory by XIXth century sociologists –to a jail by Engels-. Neuroscience has brought some additional scientific inputs into the questioning.

The organization of the school teaching around longer periods has been called **"block scheduling or schedule"**, and there have been attempts to implement it and scholarly research about it.[10]

[9] Cf Beauregard, O'Leary, "The Spiritual Brain. A Neuroscientist's Case for the Existence of the Soul", Harper One, San Francisco, 2008.

[10] Cf , for instance, the Hechinger Report; K.C. Roberts, "Relationship of Block Scheduling to Student Achievement and Learning Activities", thesis, University of New England; T.K. Landry, "Block Scheduling for the 21st Century High School. A Change Leadership Plan", thesis, National Louis University; in practical terms, see the innovative policies of New York City's Department of Education.

In fact, block schedule is as old as mankind, since traditional forms of education before the modern age were usually based on what we now call "block scheduling". Neuroscience has provided new inputs to rethink this kind of block schedule in front of the typically modern school factory based on the succession of 45-minutes class periods. A number of educators and scholars have been working in these new lines that bring education back to millenary practices.

It is quite clear that block scheduling allows much more easily than the 45-minutes periods **pedagogic innovation** in order to implement **the fundamental principles of integral education such as child-centred pedagogy, experience-based education, self-learning, etc.**

Dr Judy Willis has found evidence through her work that engaging in the process of learning actually increases one's capacity to learn. Hence neuroscientists like her can bring scientific support to advocate self-learning or experience-based education, something that the observation of the pedagogic process centuries back could already reveal; great philosophers of education in the past already defended what Dr Willis concludes.

Another neuroscientist, Usha Goswami, has brought further neuroscientific confirmation for this kind of time-tested pedagogies: learning is experience-based.[11]

Block schedule also allows **the three-phase educational process** to be completed in depth: **I. Absorption, II. Assimilation, III. Re-expression.**

This is the way how children were educated in all pre-modern societies. The 45-minutes periods system is an invention of the school-factory of the Age of Industrial Revolution that has promoted blind memorizing and academic pressure.

But quite obviously, the way how we re-organize the class periods is not enough; teachers must change their teaching methods too. So it is not a matter of changing the school schedule only, even changing the teaching methods is not enough either; all the elements of the educational process must be in tune with an integral philosophy of education.

Finally, we must point out that block scheduling can be organized in different ways, from longer periods of one and a half hour or two hours to devoting the whole morning to a major academic discipline.

In any case, block scheduling must introduce not only a longer break as in mainstream schooling but also shorter breaks within the longer periods that can be filled with some relaxation practice, physical exercise, small games, etc, according to the age group and the

[11] Cf Usha Goswmi, "Principles of Learning, Implications for Teaching: A Cognitive Neuroscience Perspective", "Journal of Philosophy of Education", vol. 42, 3/4 , 2008.

needs. Dr Judy Willis has studied with other neuroscientists the importance of these "brain breaks" which become even more crucial in block scheduling.

It is deeply biased to reduce the study of block schedule to mere academic achievement compared to mainstream scheduling, as some scholarly works present it.[12]

Studies have not proved that block schedule worsens academic results, but the defence of this kind of school organization cannot be based on mere quantitative inputs in terms of academic achievement.

Block Schedule must be part of a larger picture, that is, an integral philosophy of education that may even produce better academic achievement –see Sri Sathya Sai Schools in India- but cannot be reduced to an utilitarian argument because it is a profound philosophical issue putting forward the concept of humanity and the model of civilization -the paradigm-.
This is not a merely empirical or utilitarian matter in terms of academic marks; it is a matter of philosophy and philosophy of education: What is humanity? What kind of society do we want? What is the aim of education? Nobody can escape from these questions, and neuroscience has no response for them, because these are philosophical and ethical issues, and these more profound questions constitute the basis for all the other instrumental facets of education.

We live in a technocratic mirage that has not solved and will never solve the problems that humanity faces, that will not change human beings and societies for better, and has no more future ahead if humanity must have any future.

We need a paradigm shift and this implies a new humanism. The main issues in education will unfold from this ethical and philosophical questioning. Technical matters will be secondary and instrumental.

Then it is not a matter of pros and cons, advantages and disadvantages of block schedule in front of mainstream; this is an illusive mentality. It is a matter of paradigm, of ethical decision and world view. Mainstream schooling with its bell schedule like a factory constitutes the pedagogy of the Age of Industrial Revolution: the school factory.
If we consider it seriously, block schedule is a way of organizing the school that will naturally be more appropriate to another paradigm, holistic of course, with its pedagogic translation: integral education. It is not a technical issue with pros and cons; it is not a utilitarian matter in terms of academic achievement. It is a matter of world view or paradigm, and depending on which is the paradigm, one kind of organization will be more consistent than another one.

[12] Cf ,for instance, A. Underwood, "A Comparative Study of the Effect of Block Scheduling and Traditional Scheduling on Student Achievement for the Florida Algebra 1 End-of-Course Examination", thesis, University of Central Florida.

AESTHETIC NEUROSCIENCE: NEUROSCIENCE AND ART.

Empirical evidence and scientific grounds
Supporting the role of art in education.[13]

The mainstream school system in the modern age has been blindly narrow-minded. It has despised and neglected the arts, considering that it was not a valuable discipline to be taught in the classrooms and forcing instead children of all age groups to concentrate on "serious" subjects like maths or science from test to test.

Today, neuroscience has demonstrated that arts play an important role in brain development, which means that the despise towards arts in mainstream schooling was a pure prejudice out of ignorance in a technocratic era that pretended to be in possession of a scientific truth. Neuroscience today can say to educators that arts education will be very good for all students across all disciplines –even maths or science- due to the positive impact of arts on the development of the brain.

The same kind of research has been performed in relation to inner work or meditation, proving that meditation and other forms of inner spirituality also have a positive impact on brain enhancing mental and physical health

- It was assumed for a long period of time that we lose cells as we grow older. Recent neurological research has realized that this long-held assumption is not exact, since we can always develop our brain –which means that the brain can always grow-.
- From these new premises, a new field of research has been evolving in the last years at the crossroads of neuroscience and pedagogy. Now neuroscience is investigating how the teaching of arts may affect the brain structure, functioning and growing. In particular, this new interdisciplinary work tries to find out how artistic training may help children do better in reading, maths, etc, or how it may enhance their spatial ability for instance.

Some neurological studies have already produced startling results. For instance, a research done by the **Emory University School of Medicine** has proved that viewing the original paintings of famous artists more strongly activates the brain's reward system than simply looking at photographs of the same paintings.

More concretely, brain scanning has shown that the brain regions activated by real artistic works as opposed to mere photographs are independent from brain regions which are activated through aesthetic preference –the amygdala, involved in emotional reactions, is directly activated in aesthetic preference-. This neurological research proves that original art

[13] Cf, for instance, G.D. Shott, "The Aesthetics of Neuroscience –and the Neuroscience of Aesthetics", "Brain", vol. 135, Issue 2, 2012.

produces an impact on the brain that simple photographic reproduction of art does not produce.

The same kind of neurological research has been produced in relation to music, manifesting the neurological difference between real music and recorded in terms of impact on the brain. Hence, art positively affects the human brain.

Prof. S. Zeki from University College London has conducted neurological studies to see **what happens in the brain when we see beautiful paintings.** The magnetic resonance imaging (MRI) scan measured blood flow in the medial orbitofrontal cortex –the brain area associated with pleasure-.[14]

Quite clearly, the aesthetic contemplation increased blood flow in a certain part of the brain. When we look at art, there is strong activity in the area of the brain related to pleasure. The reaction is immediate. The increase in blood in the brain is directly proportional to how much we like a work of art. The brain blood flow increases for a beautiful painting just as it increases when we look at somebody we like or we love.

Hence**,** neurological brain scans reveal today the power of art and its direct impact on the brain. To put it in other words, we have a scientific neurological basis today to understand why spiritual masters or philosophers such as Plato or Sathya Sai Baba have so strongly emphasized the role of beauty and its pedagogic potential. Mystical traditions stated that beauty is an inherent trait of the Absolute. Now we have neurological grounds to assert the impact of beauty and hence art in the brain. Can we deny all the potential for education?

This recent neurological research confirms on scientific grounds what many philosophers and spiritual masters had already said centuries back: that **beauty and art have a tremendous transformative potential to change people for better.**

- Therefore, we have scientific evidence today to suggest that all public spaces should be beautiful –which is less and less the case in the last decades-.
- Similarly, we have scientific evidence today to recommend to public policies to make art available to the larger public.
- Finally, we have scientific evidence today to claim for the role of art and beauty in the educational process.

But will politicians and administrators acknowledge this scientific evidence after centuries of philosophical insights? Or will they continue to ignore both in order to perpetuate a technocratic civilization and human alienation?

Rauscher, Shaw and Ky have provided **physiological explanations on how classical music affects the human brain and enhances children's intellect.**[15]

[14] Zeki S., "Art and the Brain", "Journal of Consciousness Studies", 6 (6-7), 1999.
[15] Rauscher, Shaw and Ky, "Music and Spatial Task Performance", "Nature", October 1993.

Similar studies have been conducted by *J. Thompson*, who has studied **the effect of sound from a therapeutic point of view.** Sound can be used to alter the brainwave pattern and hence states of consciousness, which becomes empirically observable on brainwave mapping equipment (EEG). Apart from brain scanning, the positive effects of sound on the body can be observed through blood test, bio-feedback equipment and other technologies.

If sound and hence music can produce observable wave changes in the brain, can we deny the transformative potential of music for better –towards positive changes in character and general intellectual development-? Therefore, can we deny the fundamental role of music and art in the educational process? In the last years, neuroscience studies are revealing the undeniable positive impact of arts on children's cognitive, social and emotional development. Can the educational system blindly ignore it ? (Through a mere technocratic prejudice, which means ignoring the last scientific developments.)

Let us see how narrow-minded public authorities have been in relation to education.

In the USA, the new "No Child Left Behind Act" pressurized schools to improve reading and mathematics achievement. However, budgetary restrictions led the same authorities to cut the funds for artistic instruction in the first place. Meanwhile, an increasing number of scientific publications were demonstrating on neurological grounds that artistic training has a positive impact on the brain, enhancing cognitive development –together with social and emotional development-.

This striking contradiction is certainly the fruit of prejudice and ignorance –ignoring scientific research in the name of scientism, which is the paradox of the present technocratic civilization-. Still, we must be aware that this technocracy has produced a unique ecological catastrophe and a unique alienation of mankind –visible enough through massive depression and anxiety-.

Today, this kind of prejudice cannot stand anymore in front of the last research in neuroscience. The technocratic world view could ignore Plato or Sathya Sai Baba; but because of its technocratic essence, it cannot ignore neuroscience –which totally agrees with Plato and Sathya Sai Baba, as quantum physics has agreed with mystical philosophy-.

The technocratic prejudice –that has no more future ahead- considered art as merely aesthetic and emotional. **Neuroscience has demonstrated that art is deeply cognitive.**

- **Arts develop thinking tools** –such as pattern development, mental representation of what is observed or imagined, metaphoric and symbolic representation, abstraction from complexity, etc-.

- Still more important, the aesthetic experience can be regarded as **a form of knowledge –**like spirituality or philosophy- as valuable as science. Art –like spirituality or philosophy- can speak of other dimensions of human consciousness and reality not apprehended by the scientific method, which, by definition, is limited to a certain scope of the physical world. The new paradigm stresses that science is not the only form of knowledge, but one among others.
- More in particular, different neurological studies have shown that spatial-temporal reasoning improves after listening to classical music such as Mozart's sonatas. This has been called by the media as the **"Mozart Effect"**. However, the media forgot to say that after 10 minutes the Mozart Effect vanished, which does not deny at all the neurological impact of music on the brain, but supports the need for artistic education on a regular and long-term basis.
- Other neurological studies have shown that listening to classical music stimulates the brain areas responsible for memory recall and visual imagery.
- This explains why many people internally see mental images during a concert or evoke old memories. This also means that classical music can be used in combination with the fine arts to positively enhance the imagination and creativity of children.
- During the first years of growth, neural connections are made at a rapid rate. It has been seen through neuroscience that brain areas are developed through singing rhymes and songs, or creating drawings and paintings.
- Hence, artistic activities should be strengthened by the school syllabus.
- Brain scans have shown that the neural areas activated by music change according to the kind of music played; while melodic tunes stimulate areas evoking pleasant feelings, ugly dissonant sounds stimulate other areas evoking unpleasant feelings. Hence, if we aim at a positive transformation of the human being –and not at a negative evolution- it is scientifically evident that education must utilize good music and beauty.
- Of all academic subjects, **mathematics** is the most directly **connected to music.** In fact, counting is inherent to music. Music students use geometry to remember finger positions. Reading music implies an appraisal of proportions and ratios. Neurological imaging studies have shown that musical training activates the same brain areas that are also activated through mathematical thinking. Early musical training builds the same neural networks later used for mathematical tasks. Different studies have evidenced that students receiving musical training have performed better in maths later.
- Similarly, neurological and pedagogic studies have drawn **an equation between music and reading skills,** showing that musical training enhances the reading capacity.

SPIRITUAL NEUROSCIENCE

Empirical evidence and scientific grounds

Supporting the role of the spiritual path in education.

Among many other scientists, *the physicist N. Herbert* has acknowledged that consciousness constitutes science's biggest mystery. Herbert makes it clear that it is not that we possess bad or imperfect theories of human consciousness; we simply have no such theories at all.[16]

In this perspective, nobody can scientifically claim that consciousness is a product of the brain. This kind of materialistic statement has no scientific basis and is a mere ideological and subjective opinion. After the historical development of quantum physics, neuroscience and new science in general, to claim that the physical world is the only reality is not a scientific conclusion but a subjective ideological opinion. This book provides enough evidence about it in the last sections of the last chapter.

The forerunners of quantum physics already concluded in the first decades of the XXth century that the new quantum theory left something beyond scientific explanation: consciousness –which has been apprehended by quantum science as an original primary reality prior to any process or event described by the scientific method-.

Nonetheless, the development of neuroscience in the last years has produced increasing evidence about the positive empirical effects of the work on consciousness. Inner work –or meditative paths- have been scientifically observed by neuroscience, and the conclusion has been that there is a positive empirical impact of spiritual practice on the human being. Hence, neuroscience provides a scientific support which cannot be denied by prejudice anymore about the need to integrate some paths of inner work into the educational process.
Human civilizations knew this fact very well thousands of years back; in India this historical knowledge is still alive, and nobody has to justify with neuroscience the benefit of yoga practice for children in school. But the Western world has been so deeply biased by materialistic prejudice, that the scientific evidence brought by neuroscience gives to integral education unquestionable grounds in front of the scientific/ academic arena and public authorities.

We shall examine below some of the instances put forward by neuroscience proving the positive empirical effects of inner work on the human being –and hence on the educational process-.

These studies can be divided into two categories: imaging and clinical studies –the first being related to the observation of the brain functioning, and the second to enhancement of health through concrete parameters-.
In 2010, L. Colzato's team (Leiden) carried out **a study about perceptual brain differences according to religious groups.** This research showed that there were significant differences empirically observable among the various groups. Hence, this important study could

[16] Cf N. Herbert, "Elemental Mind. Human Consciousness and the New Physics", Dutton/ Penguin, London, 1993

conclude on neurological grounds that deeply held beliefs do alter cerebral function, so that brain function clearly reflects people's beliefs.[17]

Then, it is evident that teaching positive patterns of thought through education will undoubtedly produce a positive impact on brain function –which will be empirically observable through neurological clinical research-. Can we deny the need for the transformative potential of education through values and adequate ways of inner work positively affecting the mind?

G. Hein and T. Singer's research **on empathy also manifests striking results with decisive consequences on the educational arena.[18]**

Clinical research shows that empathy, that is, the ability to share the other's feelings, causes specific activity empirically observable in the nervous system of the person who experiences the empathy. It is also empirically observable that there is internalized brain activity of the other's mental state, which means that our attitude and behaviour is internalized by others and affects their brain function and nervous system.

The tremendous conclusion of this neurological research is that we should not fill either our life or others' lives with negativity. Another way of expressing the same conclusion, totally akin to the conclusions of quantum physics, is that we are not separated but closely interconnected: our state affects the brain of other people and vice-versa.

Can we imagine the transformative potential for education? Can we continue to overlook the value dimension of education? Today we have scientific neurological grounds to assert that education must teach positive values and the quality of relationship together with the spirit of brotherhood and community. Both the relational and the spiritual domains of integral education have undeniable scientific support.

D. McClelland's research constitutes another striking evidence to support integral value education, manifesting **the power of compassion and positive thinking and how it noticeably affects the human body,** which has been called the "Mother Theresa Effect".[19]
Through his astounding study it became empirically evident that persons watching Mother Theresa healing out of unconditional love manifested a significant increase in immunoglobulin –salivary IgA-.
Hence, love and compassion, human values and positive thinking in general, produce and up-regulation of the immune system.

[17] Cf Colzato L.S. andHommel B., "Religion as a Control Guide. On the Impact of Religion on Cognition", "Zygon. Journal of Religion and Science", 45.
[18] Cf Hein, Singer, "I feel how you feel but not always. The Empathic Brain and its Modulation", "Current Opinion in Neurobiology", 18, 2008
[19] Cf McClelland D., "Human Motivation", Cambridge University Press, 1987

Can we recognize all the potential for value education from this undeniable scientific evidence?

An amazing experiment has been conducted in several cities in different periods of time, always showing the same results that put forward revolutionary conclusions for the future of humanity.[20]

For a fair number of hours, a group of persons has performed collective meditation with a special intention to spread positive energy and values –in particular peace-. It has been empirically observed that during the same period of time the number of crimes has been significantly reduced.

One single experiment could not be overlooked, and it would be ridiculous and irrational to deny the relation and defend an idea of chance or fortuitous simultaneity. When the experiment has been repeated in the same city and in others several times, always manifesting the same simultaneous social results in terms of decrease of crime rate, nobody with rational arguments or common sense can deny anymore the link between the two phenomena: the collective practice of meditation and the decrease in crime rate.

This kind of link becomes even more comprehensible when new scientific developments suggest clear explanations for it derived from the last evolution of quantum physics, with main figures of quantum/ new physics such as D. Bohm, E. Laszlo and B. Haisch.

According to E. Laszlo,[21] all our thoughts and emotions are associated to specific brain functions. The A. Field Theory would add that these brain functions show equivalent waves, which means that our brain creates and propagates a series of waves in the space/ time frame of the cosmos. The specific waves produced by a particular individual interact in the A. Field of the cosmos with the waves produced by other individuals. The structures of interaction result in natural holograms. Generation after generation, human beings leave their holographic footprints in the cosmic A. Field. Individual holograms are integrated into superholograms that cover a tribe, a community, a nation, a civilization and the entire mankind. In fact, the global hologram of mankind is made of smaller holograms corresponding to smaller human groups or cultures.

Laszlo and quantum physicists conclude that we can have access to the information contained in this complex sets of holograms. This capacity can explain subtle connections between individuals or between individuals and Nature, since the living world also creates complex

[20] Cf Hagelin J. et al., “Effects of Group Practice of the Transcendental Meditation Program on Preventing Violent Crime in Washington D.C.”, “Social Indicators Research”, 47 (2), June 1999

[21] Cf Laszlo E., "Science and the Akashic Field. An Integral Theory of Everything", Inner Traditions, Rochester (Vermont), 2004

sets of holograms. This capacity can also explain more amazing connections with persons who already died, other planes of existence or other worlds.

Needless to say, the A. Field and the holographic nature of the cosmos have direct consequences in terms of culture, and more specifically on the essential link between civilization and states of consciousness. The present modern civilization corresponds to a specific state of consciousness –that has developed some intellectual skills but is rather primitive in ethical and spiritual terms-. A new civilization or paradigm will be associated to a new/ higher state of consciousness of humanity –which can only happen through education, as defended in this book-.

Many scientific studies have been done in relation to meditative techniques and paths of inner work in a spiritual context. This kind of experimental research has repeatedly demonstrated that spiritual practice as taught by mystical traditions does have positive transformative effects on the mind and health.

Again, can we deny the need for inner work in education after so much scientific evidence produced in the last decades?
We want to thank here the invaluable work of *Dr. P. Fenwick*, member of the Royal College of Psychiatrists and a renowned neuroscientist, towards a spiritual medicine and a neuroscientific understanding of the spiritual domain.[22]

Some clinical studies have shown how the immune system is positively affected by positive psychological factors among which spiritual life. It is obvious today that the brain system is very sensitive to immune system changes, for which the brain will be affected too.
Clinical research shows that people undergoing psychological traumas develop cancer more easily. Hence, the mental state is important in influencing the likelihood of developing cancer or other illnesses.

The opposite is also empirically visible. Through clinical research, *B.N. Uchino's team* realized that people benefiting from social support or other positive psychological factors improve immune functioning and are less likely to develop various forms of sickness. A strong faith, good relationships and positive thinking enhance the immune system, improving general health, reducing the risk of sickness –even cancer- and protecting the cardiovascular system.[23]

Laboratory research on yoga meditation has evidenced that there is an increase in dopamine in meditative states, which is particularly significant, since dopamine is involved in the reward system. Hence, the dopamine changes are clearly related to the positive affectation flowing from meditation.

[22] Cf Fenwick P., "The Neuroscience of Spirituality", The Royal College of Psychiatrists
[23] Cf Uchino B., "Social Support and Physical Health. Understanding the Health Consequences of Our Relationships", Yale University Press, 2004

In conclusion, it is today a scientific fact with clinical evidence that the mental state is very important in maintaining physical health. Once more, can we deny the need for a transformative dimension of education? It is undeniable that teaching positive thought patterns to children will enhance their mental and physical health.
Furthermore, all this scientific research has demonstrated that among all the positive factors enhancing health, spiritual life is one of the clearest with more striking results.
Therefore, can we deny the need for a genuine spiritual dimension in education through properly guided inner work?

H.G. Koenig's team realized in 1999 that **spiritually-inclined people live longer than people with no spiritual life at all.** These astounding results are still largely ignored by materialistic societies that seem to be incapable of getting rid of the prejudice established through the modern age.[24]

There have been a number of neuroscientific experiments in relation to the practice of meditation. All of them intended to check whether there are specific brain changes which accompany the practice of meditation.

To start with, meditation implies a profound relaxation of the body which is translated into decrease in blood pressure, pulse rate and cortisol.

V. Ives-Deliperi's team performed laboratory research on the contemporary practice of **mindfulness** developed in the last years, especially in the USA. This neuroscientific team was able to show that there is a network of areas close to the midline responding during the meditation with clear signals. One of these areas, the anterior insular, plays a key role in the experience of emotion. Some other areas that were clearly responding are associated with cognitive functions. [25]

B.K. Hoelzel's team also performed neuroscientific research with **mindfulness** meditation, and again found that meditation was undoubtedly affecting brain areas. Even more significant, this research demonstrated that meditation produces an increase of brain size, in particular for the medial orbital frontal cortex.[26]

A.B. Newberg's team studied a group of **mantra meditation**, and proved that the left frontal lobe was significantly enhanced by meditation. Other brain areas such as the superior parietal lobule were also clearly affected. This research also noticed an increase in thalamic activity.[27]

[24] Cf Koenig H.G. et al., "Religiosity and Remission of Depression in Medically Ill Older Patients", "American Journal of Psychiatry", 155
[25] Cf Ives-Deliperi V. et al., "Mindfulness-based Cognitive Therapy Improves Frontal Control in Bipolar Disorder. A Pilot EEG Study", "BMC Psychiatry", vol. 12, 2012
[26] Cf Hoelzel B.K. et al., "Mindfulness Practice leads to Increases in Regional Brain Gray Matter Density", "Psychiatry Research", January 2011
[27] Cf Newberg A.B., "The Neuroscientific Study of Spiritual Practices", "Frontiers in Psychology", vol. 5, 2014

Still more significant, this neuroscientific study concluded that the changes that had been observed in the frontal and parietal cortices during meditation are obviously related to the positive mental states described by the meditators.

Another neuroscientific team, led by *Aftanas and Golocheikine*, observed the electrical changes of the brain during yoga meditation. It was empirically observable that long-term meditators increase theta and alpha activity centrally and frontally.[28]

Still more enthralling, this neuroscientific study demonstrated that during the peak experience of bliss –inherent to profound meditative states- high power in the theta band clearly manifested frontally. The same observation could be done in meditative states with no thought or reduction of thought.

The study differentiated three phases in the meditative process: the incoming phase of relaxation, the thoughtless phase, and the peak phase of bliss –and finally the outcome phase. The electrical activity changed from one phase to another. All these observable successive changes correlated with the classical spiritual experiences felt by the meditators.

Scientific study of Maharishi's Transcendental Meditation (TM).

The first studies on TM were conducted at the **University of California los Angeles** and **Harvard University**, and their findings were published in reviews such as "Science" and "American Journal of Physiology" in 1970 and 1971.

From these initial studies there has been ongoing research on TM and also on other forms of meditation, although TM has been the most widely researched meditative technique. All this amount of investigation has manifested physiological changes during meditation, cognitive effects, incidence in mental health, clinical applications, etc.

In the 1990s, new lines of academic work have focused on the effects of TM and meditation in general on cardiovascular disease, with huge funding from national institutes of health.

J. Kabat-Zinn has used **modern forms of mindfulness in clinical practice** in Massachusetts. It has been strikingly evident that meditation practice linked to group therapy produces a highly significant improvement in most of the patients –suffering from anxiety, panic, etc-.[29] Can we continue to deny the tremendous potential of meditation in the educational arena to help children to positively transform themselves?

[28] Cf Aftanas and Golocheikine, "Human Anterior and Frontal Midline Theta and Lower Alpha Reflect Emotionally Positive State and Internalized Attention, High Resolution EEG Investigation of Meditation", "Neuroscience Letters", 310, 2001, Elsevier

[29] Cf Kabat-Zinn J., "Mindfulness. Diverse Perspectives on Its Meaning, Origin and Applications", Routledge, London, 2013

Conclusion. Neurological evidence on meditation.

All this neurological research demonstrates on scientific grounds that there is another state of consciousness between sleeping and waking –which is obviously more positive, since it positively enhances mental and physical health-.This new higher state of consciousness constitutes the very goal of integral education. Can it be overlooked anymore? (When neuroscience has recently provided all the needed scientific evidence proving that this higher state does exist and does positively affect the human being.) The materialistic prejudice of the modern age has no more future ahead, and only the inertia from the past can continue to deny the need for integral education with its transformative aim towards higher states of consciousness.

Last but not least: **Dr Beauregard and the scientific study of monastic mysticism.**

Dr M. Beauregard has performed laboratory experimental research at the University of Montreal with the contemplative exercises of Carmelite nuns in Quebec. His work is presented in detail in the book co-published with O'Leary, *"The Spiritual Brain. A Neuroscientist's Case for the Existence of the Soul". (Harper One, San Francisco, 2008.)*

This well-known neuroscientist has reached the conclusion that mystical states experienced by the nuns –or by monks in other places- cannot be reduced to matter or physical phenomena of the brain. Dr Beauregard concludes that the nuns –or monks- do contact some reality beyond the physical realm in the depth of their consciousness through genuine mystical experiences.

One of the major conclusions of this neuroscientific study with Carmelite nuns in Canada is that the mystical state of consciousness really exists and cannot be reduced to an illusion produced by the physical phenomena of the brain. More specifically, Dr Beauregard's neuroscientific research shows that the contemplative consciousness experiences aspects of reality that are **not available in other states of consciousness.** The reality of the mystical state of consciousness proves to be a fact that neuroscience can only acknowledge.

Dr Beauregard's neuroscientific research has demonstrated that the mystical experience is complex and leaves many signatures in different parts of the brain. This fact is undoubtedly consistent with the notion that the contemplative mind experiences a deeper reality within a vast spectrum of consciousness. Beauregard shows how specific areas of the brain are activated in association with contemplative prayer. Moreover, these patterns of activation are quite distinct from those associated with hallucination or autosuggestion, and they clearly resemble the brain processes in empirical experiences.

In parallel to Beauregard's valuable experiments, *J. Grinberg Zylberbaum* performed amazing laboratory research with tremendous implications for the future of mankind and

hence education. **This kind of experiment has scientifically demonstrated quantum non-locality in the human brain.**[30]

Two persons meditate together with the intention of direct communication –signal-less, non-local-. After some time they are separated and placed in individual Faraday cages, where each brain is wired up to an EEG machine. The subsequent experiment manifests non-local communication between the two brains that is not manifested in control subjects who do not meditate together.

As other researchers such as *S. Fernandez Vidal* suggest, the human brain is not a clock-wise machine –the metaphor of materialism and mechanism- but rather a quantum computer, from which we can naturally derive **the pedagogic conclusion: a quantum education for a quantum consciousness.**

The convergence of new physics and mysticism becomes enthralling through **the parallelism between consciousness in meditation and the unified field** –examined above-. Renowned scientists such as *John Hagelin* have been aware of this crucial connection between consciousness and the quantum vacuum, between science and spirituality **–**whereas prejudiced materialism scorned mysticism and meditation-.[31]

- Meditation means to turn consciousness inwards from the external world in parallel to the dynamic structure of the cosmos diving from the empirical realm down to the quantum vacuum.
- Meditation transcends everything till it unveils pure awareness at the basis of consciousness, just as quantum physics discovers the unified field lying beyond everything at the foundation of reality; the vacuum is also self-aware, pure vibration and pure intelligence.
- Meditation implies a totally different functioning of the brain with new brain waves, just as the unified field operates in ways totally different from the macrocosm and even the subatomic realm.
- In this new functioning, the meditative brain enhances intelligence and creativity, just as the quantum vacuum is pure vibration, intelligence and dynamic creativity.
- Mystical consciousness knows that everything is One –Yoga-, while the unified field implies oneness at the very basis of reality.

Can we realize the significance and importance of meditation after understanding the deep parallelism between meditative consciousness and the unified field or quantum vacuum –the very foundation of the cosmos-?

[30] Cf Grinberg Zylberbaum J., "El cerebro consciente", Trillas, Mexico, 1979, "El despertar de la consciencia", Trillas, Mexico, 1978, "La meditacion", INPEC, Mexico, 1991, etc.
[31] Cf Hagelin J., "Is Consciousness the Unified Field? A Field Theorist's Perspective", Maharishi International University, Fairfield, Iowa
Cf also Hagelin J., "Restructuring Physics from its Foundation in Light of Maharishi's Vedic Science", "Modern Science and Vedic Science", 3 (1), 1989

Can we continue to despise meditation as modern materialism has done, and ban it from education as mainstream schooling has done?

CONCLUSION

Together with the other branches of new science, quantum physics has shown the limitations of the former materialistic and mechanistic model, which abusively pretended to be universal, while its scope should be more limited, applicable only to a portion of reality for some specific functions -but never as a universal theory-.

With the development of new science, it has become clear enough that it was an aberration to extrapolate the Newtonian patterns of mechanistic physics to everything, in particular to life –or biology-, and even more, to the human being and society –through psychology, sociology or political science-. Life is not a machine, the human being is not a machine, society is not a machine.

The traditions of spiritual philosophy had already declared that there is something else beyond the "maya" –illusion- of the senses and the material world perceived by them. There is something more powerful and fundamental, more real, even beyond the level of energy and subtle tangibility. There is a superior reality at the foundation of the empirical world apprehended through the common mind, and this higher reality, that is more essential than the material world, has certainly something to do with consciousness.
This kind of paradigm has been progressively unveiled through the XXth century by quantum physics, which has been often aware of the parallelism between its findings through the scientific method and the profound insights of the traditions of spiritual philosophy, especially in India –although expressed in a different language, symbolical and undoubtedly more poetical-.

In this astounding convergence of quantum physics and spiritual philosophy, an unequivocal conclusion can be drawn, according to which consciousness constitutes a reality possibly more important, true and real than anything else. Moreover, consciousness vibrates; it is inseparable from energy, as Indian philosophy had always stated.

All this can only be grasped in a vision of interdependence where everything is interconnected with everything. Quantum physics has revealed through the scientific method what meta-physics had already proclaimed: there is a whole non-physical realm at the core of the physical world –let us call it information, waves of probabilities, implicate order, eternal ideas or consciousness-.

At this point, quantum theory reaches through scientific experimentation the peak of the mountain that spiritual traditions had already climbed through introspection and self-inquiry thousands or hundreds of years back. In this historical synthesis, quantum science also accepts the mystical vision of a multidimensional cosmos made of different levels of reality and different parallel universes.

In the last decades, neuroscience has made amazing discoveries that corroborate the philosophical conclusions of quantum physics in convergence with spiritual philosophy. Spiritual neuroscience has realized that the spiritual or meditative state does exit, and positively affects the body and the psyche. In parallel to that, aesthetic neuroscience has shown that art has a profound cognitive potential, which means that art should be an essential part of the school system, which brings us to educational neuroscience, a new field of research that has not done any new fantastic discovery, but that may debunk groundless fashions, and even more important, corroborate the main principles of integral education –mirror of a new holistic paradigm-.

Many persons are realizing today not only the epistemological limitations and fallacies of the materialistic/ mechanistic model, but also its inability to help making a better world and inspiring happier human beings.

The materialistic/ mechanistic world view has been the support for the kind of capitalism that has ravaged the planet until the ecological catastrophe while it has alienated humanity till massive depression and anxiety, throwing both the planet and mankind at the beginning of the XXIst century into a global crisis that has no path of return, but only a shift of paradigm ahead.

In their confluence with spiritual philosophy, quantum physics, new science and neuroscience may open the door to the most important issue: consciousness and the depth within each human being, unfolding, therefore, all the potential for holistic education and a real transformation of the human being, and hence, the world -something that the materialistic model has been unable to do-.

Nonetheless, the convergence of new science and spiritual philosophy requires some additional developments for the future:

- In order to clarify the points of dialogue and the common conclusions, knowing that their methodologies have been obviously different;
- And also, in order to unwrap and take apart the criticism coming from the resistance and prejudice of the old materialistic paradigm.

By researching about the sub-atomic world, quantum physics has gone beyond Einstein's Theory of Relativity, although for Einstein it was already clear that matter is, in a certain sense, but an illusion –as it has always been for spiritual philosophy-, since matter is but a form of energy –"slowed down" energy-. Matter is completely mutable into particles of energy, and vice-versa.

- Even so, Einstein was more reluctant to accept some other parts of quantum physics such as the Uncertainty Principle, according to which matter/ energy at the sub-atomic level does not exist with certainty in definite places but rather shows tendencies to exist. On the other hand, the Uncertainty Principle brings quantum physics closer to mystical

insights, which have expressed a less definite, more fluid or uncertain vision of reality in depth.

- In general terms, quantum physics has shown to the scientific world that the laws ruling the macroscopic level do not work at the sub-atomic level –while the latter is precisely the foundation of the former-.

As *W. Heisenberg, one of the fathers of quantum physics,* said in "Physics and Philosophy" (Harper and Row, New York, 1962, p 145):

"The ontology of materialism rested upon the illusion that the kind of existence, the direct actuality of the world around us, can be extrapolated into the atomic range. This extrapolation is impossible, however."

Centuries before Heisenberg, the spiritual traditions knew very well that this extrapolation is impossible –especially in India-. That is why Vedanta taught about the "maya" –illusion- of the material world, and Buddhism stressed that "shunyata" –emptiness- lies at the foundation of this seemingly solid world.

Materialistic science often laughed at the mystics and scorned them. Now, quantum physics should laugh at mechanistic scientists and scorn them? The fathers of quantum physics have certainly been more polite and respectful than many petty "scientists" of the mechanistic and materialistic world view who ignored that the true scientist is always open to new findings and re-consideration from genuine humility.

In any case, will the school system continue to ignore hundred years of quantum physics and several decades of neuroscience? After the historical convergence between quantum science and spiritual philosophy or Philosophical Idealism corroborated by neuroscience, will the school system continue to be the soulless alienating school-factory that Engels compared to a jail?

As quantum physics has demonstrated on scientific grounds, objectivity is one of the major fallacies of modern materialism. We cannot escape from an ethical decision and a philosophical view.

The time has come to dare to support a new form of integral value-based education that recovers the wisdom of all spiritual traditions and integrates the fascinating findings of quantum physics and neuroscience to help children grow as self-realized human beings that do not need anti-depression tablets anymore and do not swallow down all the manipulations and vulgarity of the media anymore, who can think freely by themselves, can feel in depth their humaneness, and can discover from within that there is something else, still more beautiful and powerful, that Mysterion as the Greeks called it, that Atman that is the Brahman as the extraordinary philosophy of India has called it.

Only from this deeper reality, only from this consciousness and paradigm shift, will there be genuine solidarity, peace and unity on Earth.

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