



Research Article (*Postface*)

Vocation Supported by the Passion of Emeritus Professors Teaches Young Investigators to Grasp the Unexpected in Science

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Dedicated to:

Jeremiah Stamler, MD (Brooklyn 1919 - Sag Harbor 2022)

Professor of Preventive Cardiology at the Chicago Northwestern University

Founder of cardiovascular epidemiology and preventive cardiology.

Coordinator of the Intersalt Study (1984-1997), Professor Emeritus 1999-2022,

Pioneered the need to separate data for men and women, [1].

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Abstract

Aging is a universal theme continually explored by artists, writers, poets, lyricists, philosophers, physicians, biologists, sociologists, and economists. Our society is aging as birth rates decline and lifespans extend, thanks to improved living conditions made possible by progress. Lifespan has nearly increased by one-fourth and will soon reach one-third. However, there are inequalities. In the poorest countries, the difference in lifespan may exceed 30 years. Across Western countries, individuals in lower economic classes live 3-5 years less in Italy, 10 years in France, 11 years in the United Kingdom, and up to 20 years at the two extremes of the Washington metro line. There is general agreement that intergenerational harmony must be achieved to avoid conflicts. In many countries, retirement is based on age (between 60 and 70 years). In the USA, retirement has become a personal decision. There is, however, consensus that the older population of our time is now healthier and more vital than the post-World War II generations. Consequently, there is a growing desire within academia to continue working in roles that are socializing and fulfilling, benefiting from large personal networks. Retired scientists often know every detail of their disciplines, remain active contributors to their fields, and enjoy teaching younger generations. There is a quest to reinvent retirement. However, this may conflict with the need to make space for younger generations.

Key Words: Academia, Aging, Intergenerational harmony, Life span, Retirement, Reinventing retirement.

What is aging?

Aging is a complex process. However, a bold and provocative answer to the question might be: 'Not just a disease' [2]. A complete answer may benefit from the additional elements [2] listed below:

"A disease" (Terence), "a problem for the elderly" (Gottfried Benn). "It's the moment when you realize that the journey is not only not complete, but you no longer have time to complete it and must give up on reaching the final stage" (Norberto Bobbio), "Old age" (Gabriella Caramore). "The age of desire" (Francesco Stoppa). "The age of rights" (Roger Dadoun). "The experimental age" (Erri de Luca, Ines de la Fressange). "The age in which strength of character and a drying up of body and soul are revealed" (James Hillman). "The age when I can no longer waste time doing things I don't want to do" (Paolo Sorrentino, The Great Beauty). "A time characterized by the opacity of the body and the collapse of desire" (Aldo Masullo). "The time when the past is lived while looking forward" (Marta Nussbaum). "The age to be invented, the age of fragility" (Vincenzo Paglia). "The age when scientists no longer progress" (Martin Rees, Lord Rees of Ludlow). "Not a battle but a massacre, when the body is in a war you've lost" (Philip Roth). "The age of wisdom" (Adolfo Russo). "A restless time" (Cardinal Angelo Scola). "The corporeal swamp of memory" (Mario Vargas Llosa). "A dress in tatters" (William Butler Yeats). "Being on the threshold to set out towards 'that undiscovered country from whose frontier no traveller returns', to repeat Hamlet's bitter consideration" (Ortensio Zecchino). "Aging is not a disease" (WHO) [3].

Aging: a gift and a curse

Aging may be a gift as well as a curse, and it forces us to be active and creative in answering the many questions arising with this process. It calls for significant changes in managing the many problems heretofore unknown.

In world literature, immortality has always been depicted as both a gift and a curse. It was a gift for the Biblical Patriarchs, who remained active and fertile throughout their long lives. Recently, Pope Francis stressed that older persons are special beings since they are memory keepers. A role of the utmost importance since, as Edith Bruch says, "Memory is life" [4]. Pope Francis emphasized the richness of older age, which provides the opportunity to share their wisdom and experience with humankind. For him, older persons, who have never been so numerous, are a real "new people," "the people of the future." "They are the roots of the tree; they are the history that sustains us, yielding, flowers and fruits" [4].

Immortality, however, was more often a curse. From Homer, Hesiod, and Euripides, we learn the story of Eos and Tithonus. The latter was very handsome and attracted the interest of Eos (the goddess and sister of the Sun). She asked Zeus to grant immortality

to Tithonus in order to have him as her eternal lover. But she forgot to include eternal youth. Zeus granted immortality to Tithonus who grew older and older, lost his physical charm and also his interest in Eos. Eos was therefore forced to lock him into a separate place and later asked Zeus to turn him into a grasshopper.

Old age was also a curse in Jonathan Swift's *Gulliver's Travels*. In the country of Struldbruggs, "as soon as they have completed the term of eighty years, they are looked upon as dead in law; their heirs immediately succeed to their estates; only a small pittance is reserved for their support; and the poor ones are maintained at the public charge. After that period, they are held incapable of any employment of trust or profit; they cannot purchase lands, or take leases; neither are they allowed to be witnesses in any case, either civil or criminal, not even for the decision of meers and bounds. Immortality is also a curse in Borges' *The Immortal*, a story about Marcus Flaminius Rufus, a character who arrives at the City of Immortals (a labyrinth) and meets troglodytes. Among them one confesses to be Ulysses. However, hundreds of old and old-old artists, from Michelangelo to Matisse, have created masterpieces [5, 6].

Emeriti and retired professors in medicine

In 2014, a study by De Santo NG, Altucci P, Heidland A, Stein G, Cameron JS and Rutkowki B, analyzed the role of emeriti and retired professors in medicine [7, 8].

The study was conducted across 99 departments of medicine at 99 universities in 20 countries representing low, medium, and high economic levels using an ad hoc questionnaire. The questionnaire was emailed to 63 active professors and 64 emeriti/retired professors. The response rate was 89.1%. In 83.8% of the universities, there were rules in the constitution to nominate emeriti. Emeriti could apply for grants and donations in 42.4% of the universities. In 56.7% of the universities, emeriti were allowed to keep their offices, and in 41.4%, they had access to a fully equipped laboratory with email and phone. In 35.4% of universities, participation in department meetings was possible, but in few of them was a right to vote granted. Teaching at any level was possible in 30% of the universities. In 41.2% of them, emeriti continued to engage in research and published at least one impactful paper or one book in the last 12 months. Many emeriti produced more than seven items, and some published more than ten impactful papers.

Jeremiah Stamler, the scientist who fully embodied the role of professor emeritus

In 2019, Hannah Natanson of the Washington Post announced Stamler's 100th birthday and wrote

"At 99 (in 2019), Stamler still teaches, advises colleagues and leads research at Northwestern, where he joined the faculty in the early 1960s. He has just won a competitive grant for studies on correlations between blood pressure and the human metabolome." "He dismissed as foolish the suggestion that spearheading

vital scientific research as a nonagenarian could be difficult. “Why should it be hard?” he said, with a laugh”. “Some people think you gotta be crazy, at my age. But if its fun, and you’re productive, and it’s useful for mankind — why not?” [9].

As Professors Massimo Cirillo wrote for the EAPE newsletter no.7 in 2021 “The experience of my long scientific and personal collaboration with Dr. Stamler of [almost 40 years] taught me that the contribution of a Professor Emeritus is unique and irreplaceable. The work and life experience are an incredible added value to an academic institution” [1].

On retiring scientists and aging artists

In 1963, Derek De Solla Prize in Little Science Big Science pointed out that “Any retiring scientist looking back at the end of his career upon a normal lifespan will notice that 80 to 90% of the scientific work has taken place before his very eyes”...“every retiring scientist is a walking, living, eyewitnessing historian of most of the science that molded his or her discipline” [10]. Indeed, he probably wanted to say that the science that matters most to each individual scientist is that which developed during their own lifetime, with their active participation. The earlier developments are then seen as just a prologue, holding historical value only. Retired mentors are reservoirs of wisdom and knowledge of their disciplines, and they can successfully draw from the expanded personal networks developed over the years in the academy.

The German poet, essayist, and physician, Gottfried Benn-nominated for a Nobel Prize five times - wrote in “Altern als Problem für Künstlers” that in the last four hundred years 150-200 geniuses determined the cultural progress of Western Europe [11]. Most of them were old-old. Galileo Galilei at 75 years of age published, in Leyden 1638, a few years before his death, “Discorsi e Dimostrazioni matematiche intorno a due nuove scienze”.

The board members of the EAPE Bulletin had the privilege of publishing an original article on “Complexity” coauthored by Edgar Morin, one year before his hundredth birthday [12]. The late Sir Michael Atiyah-one of the greatest experts in geometry, and recipient of the Fields Medal and the Abel Prize- and former President of the Royal Society - at 88 years of age, demonstrated the validity of the hypothesis of Walter Feit and John G. Thompson on the theory of groups (concerning symmetry in geometry and algebra).

Furthermore, Roberta Sinatra and her co-authors published in Science in 2016, “Quantifying the evolution of individual scientific impact,” which explores the career trajectories of scientists. They showed that many scientists received the Nobel Prize for the part of their research conducted when they were retired and had left the academic institutions. Thus, there is no specific age for producing a masterpiece; the distribution is random, and the most important discovery may be the first as well as the last in the career of a sci-

entist. Another typical example was John Fen, who was nominated for the Nobel Prize in “Chemistry,” in 2002 for research conducted many years after his retirement [13].

Indeed, many artists including David Bailey, Montaigne, Katsushika Hokusai, Henry Moore, Oscar Niemeyer, produced masterpieces in their late years. Titian, at age 86-88 on his last day painted Danae a recurrent theme in his life. It is said that, while working on this masterpiece, he asked his collaborators to bring him all past works still in his possession and his comment was that “until that very day, he had been just a weak canvas-knacker, a dauber.” Rembrandt painted many self-portraits in the years between 1629-1663, and their quality and power did not decay with aging. In addition, at the Rijksmuseum in Amsterdam, one can admire his Isaac and Rebecca (The Jewish Bride), which has been defined by Roderick Conway Morris “as one of the most exciting studies on aging and on a life lived with fullness.” In his late days, Leonardo was nominated by Francis I of France as “First Painter, Architect and Engineer of France.” During those years, he completed Mona Lisa and refused to sell it to the King of France, since he wanted to enjoy it until his own death, being aware of its outstanding value. Michelangelo worked until the last days on La Pietà Rondanini (Milan, Castello Sforzesco). Anton Gaudi worked for La Sagrada Familia until his death and Ian Mirò completed La femme et l’oiseau when he was 90 years old [5, 6, 14-18]. Additional information, mainly on De Chirico, was discussed in the creativity of Aging Artists and Scientists, a symposium on Aging of the Population organized in 2021 by the Croatian Academy of Art and Science and by the University of Rijeka [19].

On Professors Emeriti

In Encyclopedia Britannica, “the term emeritus is defined as an honorary title given to a person who has retired from an active professional role, especially from a university position, while retaining their former rank. The term comes from Latin, meaning to “earn out” or “serve out one’s time,” originally used for Roman soldiers and officials who had served their term. Emeritus is used as an adjective, such as a “professor emeritus,” or as a noun, referring to the person themselves (an “emeritus”). The term is rooted in Latin and Roman history, signifying someone who has earned their retirement through long service. Today, it is most commonly associated with academia, but it can also apply to other professions like ministers or editors who have retired but retain their title honorarily”.

For J. Periam Danton, Emeritus at the University of California at Berkeley: “Emeritus professor is a retired professor who retains an honorary title that corresponds the last he had in his university. Professor is a Latin masculine noun; this explains why we speak about “Emeritus professors” and rarely of professor emerita,—although possible—preferring to speak of emeritus both for men and

for women” [13].

The debate on professor’s emeriti and retired in Nature

Nature has been actively participating in the debate on professor’s emeriti over the past decades. The issue of scientists capable of producing excellent research, who wish to continue to working, and who oppose mandatory retirement, has been thoroughly examined.

A 2005 editorial suggested “Greater use of the ‘emeritus professor’ system, where researchers maintain an association with an institution while drawing their salary from their pension, can tap into the experience of older specialists who are no longer active in research. Research institutions and governments should also be exploring ways to accommodate those who wish to remain active in research and have a contribution to make” [21].

In 2008, Peter A. Lawrence, Professor at Cambridge called for abolishing mandatory retirement, arguing that it “ensures dignity and justice within the enterprise of science [since] “the effects of compulsory retirement are multiple and insidious...it turns able academics into the lame ducks: They cannot take on commitments such as supervising graduate students, and they lose their negotiating power because they are unable to seek new positions”. Since “merit should be the guide,” Lawrence affirmed “the right of every individual to be considered for work on merit and to negotiate for remuneration” [22].

In 2015, Megan Scudellari, a Boston-based science journalist, interviewed scientists about the limitations faced by new generations in securing positions due to the dominance of older scientists [23]. Among the answers, one stated, “It is not understandable to force people to retire when they are still contributory.” “The ideal would be that no one checks how old you are, but simply looks at what you are doing and what you are able to do.” “Working after 65 is working because you want to, not because you have to.” “There is no evidence that shows that early retirement can reduce unemployment.” “Payng senior people to retire actually increases unemployment.” “There is not a fixed number of jobs in the economy, so the idea of one-to-one replacement is false.”

There may be joys in research in retirement, even with minimal support, such as a table and a provided stipend from a former employer, along with free access to online literature searches. This arrangement offers the opportunity to develop new ideas, establish collaborations, and publish during retirement some 30 papers, one of which invalidating a 30-year-old theory [24].

Amber Dance, a freelance journalist and writer, discussed “What does it mean to be emeritus?” [25].

“In some countries, it’s a title that comes with everything connected to retirement status. But in most cases, it’s a distinction, a

title awarded for services rendered, a final promotion conferred by ad hoc committees whose appointments are carefully monitored by universities. This is the culmination of a career begun as a fellow. The literature is full of interesting stories of emeritus professors. It’s not a waste of time: you can continue to use your talents and succeed, not necessarily at the university. Emeritus professors often join associations linked to their own university, now often in national or supranational associations, such as the European Association of Professors Emeritus, which, founded in 2016, hosts stimulating conferences. Besides promoting emeritus status as its primary focus, it has a stimulating website and produces a noteworthy bulletin” [18].

Retirement in the academy

In Europe, the retirement age is around 65 years in the United Kingdom, while in France, Germany, Italy, Spain, and Sweden, it is typically 70 years. Everywhere, having ongoing grants allows for a prolongation of up to three years. In Italy, due to a shortage of physicians, physicians, including those working in the academia, can retire at 72.

In France, the duration of academic or professional positions is usually set at four years and can be renewed by productivity, but a specific status does not exist. A legal ruling by the Higher Court confirmed that age-based retirement is related to creating space for younger professionals.

In Italy, the Universities of Calabria in Rende (established in 1972) and Ca’ Foscari University in Venice (established in 1868) permit emeritus professors to fully participate in teaching, including both official and supplementary courses. They are also authorized to oversee public and private grants. This approach allows emeriti to continue their work without separating research from teaching, which embodies the core mission of university faculty [26-28].

The University of Ca’ Foscari, Italy’s first institution dedicated to commerce, was founded on August 6, 1868. It is structured into 8 departments and 3 schools, serving the needs of approximately 21,000 students with the support of 1,100 researchers and professors. Its bylaws state [26] that professor’s emeriti and honorary professors are allowed all activities listed in the (Table) below.

Continue to undertake research within the departments where they worked.
Continue to undertake research within the departments where they worked.
Coordinate projects from third parties only after obtaining approval from the Department Council.
Teach in official courses, usually at no cost, or even be remunerated if permitted by law, following nomination by the Department Council.

Serve as members or chairs on committees for curricular exams and for degree examinations.
Teach in PhD courses, subject to approval by the PhD School Council.
Participate in meetings of the departments where they were active at the time of retirement, with an advisory vote.
Participate in the meetings of the Didactic College and those of PhD College if they hold a course title.

Table: Activities of Professors Emeriti at University Ca’ Foscari in Venice [26, 27].

Retirement: value, regulations and refusal

In the USA, a 1967 Public Law made it illegal to discriminate against persons over the age of 40. An amendment in 1987 further prohibited most employers from setting any mandatory retirement age. However, academic institutions were allowed to postpone full implementation of the law’s effects until 1994. This event was celebrated as a demonstration of democracy by Martha Nussbaum in “Aging Thoughtfully”:

“Like all Americans of my generation, I have been rescued from a horrible fate by the sheer accident of time. At sixty-nine, I am still happily teaching and writing, with no plans of retirement because the United States has done away with the compulsory retirement. I have been able to anticipate happy productivity in my later years. The United States has done well to reject compulsory retirement and to adopt laws against age discrimination” [29].

As underlined by Garabed Eknayan “When to retire in the USA has gradually shifted into an individual decision, with a concerted effort by the parties involved (institutions, academicians) to create room to slow down but continue to benefit from the experience and wisdom of older faculty, particularly for those who actually remain creative and are externally funded for their research. Options such as reduced teaching and administrative responsibilities, accompanied by corresponding reductions in monetary compensation, are increasingly used as alternatives to retirement in the USA [30, 31].

Currently, age does not serve as a discrimination factor in the USA, Canada, UK, or Australia. Judith G Hall, University of British Columbia at Vancouver, thinks, “There is still a push for older academics to retire, perhaps even earlier, to make room for “new blood” and new ideas; and that older folk should just enjoy life and fulfill one’s “bucket list”. It is true that, as senior academics retire, health permitting, he or she should get to do what they want. [There is evidence] that, on average, people become happier as they age. Furthermore, data show older workers are more reliable, see the “big picture,” and are better at finding solutions in the workplace. Several studies indicate they mentor the younger workers and lead to more collaborative work. We are an incredibly

privileged group, but in theory, we can model new roles for individuals over 65 as more and more of us live longer and healthier lives. We represent an enormous human capital that should not be wasted.” [32].

However, according to Martin Rees (b.1944) —Lord Rees of Ludlow—“It is a conventional wisdom that scientists do not improve with age; they “burn out.” For Rees the best for a retiree “is to continue to do what one is competent at, accepting that there may be some new techniques that the young can assimilate more easily than the old and that one can probably at best aspire to be on a plateau rather than scaling the heights. There are, however, exceptions.” Rees also underlines that the physicist Wolfgang Pauli had a famous put-down for scientists past thirty. “Still so young, and already so unknown” [33].

Generally speaking, mentors appreciate the opportunity to give back and remain engaged in the field, to relive past academic career experiences, and to support the next generation.” [34].

In the USA, a recent systemic literature review disclosed that “for most, retirement is characterized by continuing to work in aspects of their role, maintaining associated relationships, with gradual disengagement from academic activities. For another smaller group, the retirement pathway is experienced as an event, with complete detachment from academic activities” [35]. There are many reasons for seasoned academicians to continue their fulfilling work, such as teaching younger generations, conducting research, and transferring professional skills.

Their appealing jobs offer them several benefits (i) a vast personal network of students, former colleagues, and connections with national and international organizations; (ii) a well-remunerated position; and (iii) social benefits. However, these advantages should be weighed against the risk of marginalization. A study on academic ophthalmologists found that the decision to continue working was driven by “desires to remain actively engaged, receive insurance or benefits, and maintain their lifestyles.” Among the various new options for retirement—such as flexible work, phased retirement, and bridge employment—these may hold some appeal if they allow individuals to partially preserve their academic roles [36].

There is a reluctance among academicians to retire. “Retirement is one of the most impactful transitions in life,” as it signifies a major change. “Work represents the primary source of socializing and connections; change the nature of work, and you change the nature of life” [37]. Work is the place where vital personal networks originate. If life expectancy increases by a quarter, and soon by a third, one cannot simply aspire to long periods of leisure. The university campus serves as the center of interests—where interactions with students and their needs take place, and where engaging in research makes the hours enjoyable. It is a competitive and appealing environment where “jobs give a musical rhythm to life,

providing a sense of self-satisfaction” and economic benefits. The campus is also the space where every scientist has the opportunity to create a niche within their discipline, highlighting their personal role in the scientific enterprise. Therefore, retirement represents a significant loss—a period of marginalization that can diminish the spirit of competition and ongoing engagement [37].

Losses connected to retirement

Losses associated with retirement were quantified in the work of J. Perian Danton, as previously mentioned [20]. According to the study, 92% of retirees no longer participated in committees for recruiting new professors, and nearly 60% were no longer members of thesis committees. Additionally, 57% had lost their offices, and 61% were never called upon even for temporary teaching activities. Secretarial privileges were completely abolished for all, and there was no longer any opportunity to conduct research.

The loss of the workplace was the most painful aspect, as it was the space where individuals stored papers and books, met with students, colleagues, and visitors, and engaged in thinking and writing. It was a place for interaction within the academic community, where one could ponder, develop ideas, and plan projects. The workspace served as a hub for storing materials, reflecting, writing, and collaborating. Even basic amenities, such as parking, were taken away, and the librarian services had lost their efficiency.

It is not surprising, then, that 10% of retired academics “felt alienated from their schools- feeling unappreciated, unconsulted, and unutilized”. In fact, most retirees did not vote, participate in faculty searches, or serve on dissertation committees.”

Reinventing Academic Retirement

Our society bears the responsibility of reinventing academic retirement to recognize that “many talented and highly educated academics possess considerable expertise and experience that they can continue to share productively in their post-retirement years”. This is no easy task, as academia is the place where the future is created—where new ideas find a fertile environment to develop. However, the institution as a whole tends to be conservative, and changes can only be implemented when all parties reach a consensus. The process of change might gain momentum by embracing the idea that retired scientists are not a burden but rather an asset to their institutions and society at large. Work in universities is often driven by passion, and fostering this new perspective requires building consensus. Though such change may take time, it is essential that all stakeholders recognize the importance and potential benefits of engaging retired academics [38].

Teaching, a fundamental mission

The by-laws of the European Association of Professor Emeritis have the following incipit: “We believe that a university professor

is called to continue his vocation as an educator, counselor and researcher for life. Especially in these difficult times, the emeriti and retired professors offer their aid to their still-active colleagues and to society in general on a voluntary and public-benefit pro bono basis” [32]. Teaching is the fundamental element of the mission of the emeritus status. “Prime among the goals of emeriti is to maintain the real mission of “Teacher.” Teaching is a noble profession; the function of the Teacher, Mentor or Educator extends beyond School and university. An enlightened person in all strata of society can advance “Knowledge”. In true essence knowledge, education, “gnosis” in ancient Greek, implies not a mere accumulation of data but an introduction to acquiring a new perception of the value of life, and an insight into creative and productive thinking, which alone leads to important advances and discoveries which shape mankind” [39, 40].

Indeed the most valuable agreement shall come from the younger generation. Intergenerational harmony must be achieved. Scientists have been unable to understand the changes associated with an aging society. This is a prerequisite in a society that is aging upward and downward (fewer children, longer life spans. It means that sociological science has not adequately addressed this fundamental issue, studies on demography have probably not been properly funded. It is not without significance that, in Europe, we have a Directorate for Democracy and Demography.

I want to provide a few examples from experience made at the European Association of Professors Emeriti [39]. Retired academicians (i) either never stop to serve the development of their disciplines [41-52], (ii) or to privilege education [53] or (iii) to serve their country in multiple tasks [54], (iv) or protecting the beauty of nature [55 and/or (v) that of art and science [56].

Role of Professors emeriti in reinventing academic retirement

In many countries, including Italy, Academic retirement is usually associated with the loss of the title of professor. Professor emeriti are a special category of retirees; they are called professors until the end of their lives simply because, after retirement, they are recognized as emeriti (ae). They are encouraged to actively contribute to reshape academic retirement. They can offer many advantages: they can act as guarantors of merit in academic endeavors possessing the capacity to attract, nurture and enroll talented individuals: the human capital in academia. They also have the attitude to recognize those “who can build sand castles. Nicholas A. Christakis, Professor of Social and Natural Sciences and of Medicine at Yale, has explained his attraction to the towers made of minute silica crystals. “Some people like to build sand castles, and some like to tear them apart. There can be much joy in the latter. But it is the former that interests me. You can take a bunch of minute silica crystals, pounded for thousands of years by the waves, use your hands, and make an ornate tower. Tiny physical forces govern how

each particle interacts with its neighbors, keeping the castle together [57-59].

Professor's emeriti represent a vast cultural heritage, currently underused or frozen that can be placed at the service of the needs of citizenship. They are the people who can go beyond borders, to go beyond limits. To think "is to transgress" in the Latin sense of "transgredior". After all, the man of thought, the wiser, is always a "transgressor". A professor emeritus is a "transgressor", and can meet the beyond [60]. "We have a gigantic challenge ahead of us for the next few years: transforming the current diversity of culture into a culture of diversity, which promises to be not only possible but herald's great opportunities for the future" [60].

Emeriti may be considered those who are aware that "to make a step backward after making a wrong turn, is a step in the right direction" [61]. They support meritocracy [62], which not only the support of talents, careers open to all, equality of opportunity and places and positions assigned to the best [63], but also fight against elitism [64].

On Masters

In *Utopia e Disincanto* (Utopia and Disenchantment) [65], Claudio Magris (born 1939), a writer with a strong European vision of cultural heritage, a former university professor of humanities, and a senator, discusses masters and students, drawing inspiration from a Midrash, a rabbinic commentary featuring Rabbi Meir, a master of Jewish Orthodoxy, and his heretical teacher, Akher. On a Sabbath, they were vigorously discussing religious issues. Rabbi Meir arrived in observance of the prohibition against riding on a holy day, while Akher rode on a donkey. Having reached the furthest limit possible on a holy day, Akher invites his student to stop and turn back. "Master and student have different visions and different faiths. The former does not teach the student a theological truth, but how to seek it. He teaches him clarity of thought, a passion for truth, and respect for others. The master does not impose his ideas on the student, does not seek followers, does not create copies of himself, but rather people capable of walking alone. The Master is such because he knows the right path for the student, and helps him follow it while avoiding seduction. Masters teach by discussing with students, correcting them and even receiving corrections. Above all, masters teach the responsibility of facing the consequences of every position taken".

Nobel Prize winner Max Perutz, in "Is Science Necessary" [66], talks about François Jacob when he was looking for a mentor and turned to André Lwoff, who repeatedly rejected him. One day, after a broomstick session and in a moment of grace, Lwoff repeated the request in an excellent mood. "The mentor was so elated that he decided to say yes. After that, he always treated him like a son, encouraged him, and instilled in him self-confidence."

Passion

Nothing can be produced in the academy without passion. "Passion, cannot be replaced by reasoning. Passion accompanied by self-discipline, which makes me sit at my desk every morning and go to work like a manager or an employee who punches a time clock." (Oriana Fallaci, 1929-2006).

"The scientist is not someone who turns the knobs of discovery, because whatever the object and commitment, scientific research is an undertaking of passion. The progress of natural sciences depends on the outcome of a courageous foray into what can be imagined but is not yet known (Peter Brian Medawar, Nobel Prize 1960). "Most scientists' work is far more than just a job — it is a vocation, pursued with a passion that cannot be switched off overnight" [21].

The details of the experimental process: Teaching to catch the expected and the unexpected

In science, good results are obtained through the rigorous application of rules. Carry out all the steps of the experiment after carefully planning them, hoping to generate not only the expected but also the unexpected, which is the ultimate goal, often unattainable in the life of a researcher who moves from the particular to the general, that moment that sublimates the specialist. One must prepare for this as one does every day in laboratories around the world.

Teaching to catch the unexpected. The value of the unexpected is defined poetically by Nobel Prize winner Eugenio Montale in "Prima del Viaggio/" Before the trip [67]:

Before the trip the timetable is checked,
the connections, the stops, the layovers
and the bookings....

And then one leaves and all is OK, and all
is for the best and pointless....

And now, what will become
of my trip?

I studied it too carefully
without knowing anything of it. The unexpected
is the only hope. But they tell me
it is stupid to tell oneself that.

Capability in Promoting the Exchange

For Hannah Arendt (1906-1975) good teachers are those capable to promote the exchange. Her model was Karl Jaspers (1883-1969). "The exchange generates something exceeding the sum of

individual contributions. Something that is between (zwischen, in German). Something beyond everyone's reach but which helps us understand each other". Language and communication bring not only popularity but also continuous exchange. This includes questions and answers, and truth unites. Dialogues that unite space and time and connect today's generations with those of yesterday, as if they were alive. According to Hannah Arendt "Jaspers never gave his students the impression that he had prepared the lesson. He gave his students the impression that his thoughts were generated during the lesson. He did not aspire to academic teaching. He just wanted to teach his students to think for themselves. He used to speak clearly, a characteristic he also expected from others" [68, 69].

George Steiner, Lessons of the Masters

In Dante's XVth canto of *Inferno* he encounters his master Brunetto Latini (c.1220-1294), and addresses him with respect "Ser", "Sietevoi, "lo mio maestro" emphasizing the importance of the teaching he received from him:

Ad ora ad ora

Mi insegnate come l'uom s'eterna.

George Steiner (1929-2020) commented: "Extreme simplicity is untranslatable. Seven words in which Dante compacts and defines paidea[...] the crux is s'eterna. Eliot Norton "you taught me how man makes himself eternal". This is indeed the standard rendition. It misses the thrust, the unfolding of the original French allows the verb s'eterniser. Great teaching, the education of human spirit toward aesthetic, philosophical, and intellectual pursuits "eternalizes not only the individual but mankind. Fortunate the disciple whose master has given to mortality its sense" [70].

Conclusion

"Higher education is a key to democracy, social justice, equal opportunities, and wisdom [71]. It can also contribute to intergenerational harmony, which is a prerequisite for the elderly to remain active and to make full use of their talents; in other words, to be recognized and accepted for their merit. Just for their merit" [72].

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