Making a Difference in and Beyond the Ivory Tower: Advance a Theory, Start a University, and Transform a Country's Education

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The contributors to this special issue were invited to describe contributions that made "a positive and meaningful difference to the world beyond scientific publication," to specify the impact of these contributions, and to talk about the challenges faced and how meaningful this was for life and career. This is a challenge indeed. Whatever we do in academia pales by comparison with contributions of many historical figures within but especially outside academia. However, I decided to accept the invitation to reflect on my own life and choose among my reflections those that might be of interest to some people. After all, as a developmental scientist, I would like to be useful to life-span developmental scientists who study life-span development with an interest in how a professional career is chosen, how it interacts with important life events and cycles, and how it provides meaning to life at different life phases. This may be useful to fellow academics and researchers who are tempted, or invited, to serve in demanding administrative positions in academia, such as the office of university rector or the office of government minister.

The Political and Academic Context

Let us first outline the political and academic context of my activities. I grew up in Cyprus, a place where history is still active and far away from "the end of history" in Fukuyama's (1993) terms, if there will even be such an end. That is, I was a child in the 1950s, when Cypriots fought a war against the British; an adolescent in the 1960s, when Cyprus became independent and was striving to provide prosperity and peace to its citizens; and an adult thereafter, when Cyprus experienced a civil war, an invasion from Turkey resulting in continuing occupation of a third of the country by Turkey, and an endless process of negotiations that may hopefully settle a political dispute that dates back centuries.

This invites a youngster to stay politically and socially alert and involved and possibly make a difference that counts.

Academically, I was educated under both the spirit of the German Bildung and Anglo-Saxon empiricism. I studied psychology at the Aristotle University of Thessaloniki, Greece (1970–1975). Psychology was embedded into a very broad program of studies, including philosophy, education, history, and classics, which made study in a discipline into a broad social and academic perspective in which specific contributions or ideas must be evaluated against contributions and ideas of historical magnitude in different disciplines. I completed my studies at the Aristotle University with graduate studies at the University of New South Wales in Australia (1978), where education emphasized methodological rigor and empirical power. This puts scientific contributions and ideas under a strict epistemological perspective requiring that they are tested for truth and validity, regardless of how big or attractive they appear.

Under this context, the triarchy of my life commitments were as follows: (a) Be useful to science as an active researcher; science goes beyond schools of thoughts or universities. (b) Be useful to academia; academia is the frame where science is done, and it needs service beyond one's own research program. (c) Be useful to the community and society as an active citizen; society goes much beyond science and academia however important both are for the community. In short, each commitment must be viewed from the perspective of a higher loyalty.

The focus of the present article is on contributions related to the latter two points, because the first point

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is concerned with contributions related to publications. Thus, I will be very brief regarding the first point.

Contribution to Psychology and Education

I spent my whole academic life striving to develop a comprehensive theory of cognitive development. In the late 1970s, when I started my research, Piaget's (1970) theory was still the dominant model of cognitive development. By that time, many of the problems of this theory were obvious to cognitive-development researchers. Many of Piaget's core constructs, such as stage and structure of the whole, generated predictions that were not consistent with empirical evidence. In the 1980s, when my research program started, there were several neo-Piagetian theories under formation motivated by the same goal. Notable among them are Pascual-Leone's (1970; Pascual-Leone & Johnson, 2017) and Case's (1985) theories. These theories postulated that progression along cognitive developmental stages is a function of increasing working memory (WM) and mental attention. However, empirical research of the time showed that these constructs, although part of the picture, are not enough to explain how and why reasoning changes with age. Thus, I set myself the task of developing a comprehensive theory that would integrate aspects of Piaget's theory that have stood the test of time (e.g., the systematic changes in reasoning throughout childhood and adolescence; Inhelder & Piaget, 1958) with aspects coming from cognitive psychology (e.g., relations between reasoning and information processing capacity; Baddeley, 2012) and the differential tradition of psychology (e.g., individual differences in dimensions of ability of varying generality; e.g., Jensen, 1998).

Thus, the theory specifies a common core of processes (*abstraction, representational alignment*, and *cognizance*) underlying inference and meaning making. This core develops over four cycles defined by the nature of representations that dominate in each (*episodic representations, realistic representations, rule-based concepts*, and *principle-based concepts*, starting at birth, 2, 6, and 11 years old, respectively) with two phases in each (*production of new mental units* and *alignment and integration*). This sequence relates to changes in processing efficiency and WM in overlapping cycles such that relations with efficiency are high in the production phases and relations with WM are high in the alignment phases over all cycles. Each cycle culminates in cognizance about the cycle's representations and underlying inferential processes that is expressed in executive programs of increasing flexibility. Learning addressed to this insight accelerates the course of reconceptualization. Development in different domains translates this core into the representational and procedural codes of each domain. The interested reader may consult my recent book (Demetriou & Spanoudis, 2018) and a recent overview of the book that is the target of discussion in *Human Development* (Demetriou, Makris, Kazi, Spanoudis, Shayer et al., 2018).

The reader may recognize that the underlying common core specifies the processes involved in the psychometric *g* factor and highlights its developmental transformations that have escaped cognitive developmental or psychometric theories of intelligence. For instance, we showed that different levels of intelligence expressed through IQ measures correspond to different types of representational and problem-solving possibilities as expressed through the developmental reconceptualization cycles outlined above. This bears important implications for the kind of intelligence available at different age phases or the general population. For instance, an IQ of 100, which two thirds of people meet or exceed at maturity, corresponds to the second phase of the cycle of rule-based concepts, which is attained at 9 or 10 years of age. The recycling of representational changes is related to changes in aspects of processing efficiency, such as speed, attention control, and WM, pointing to phenomena that were not observed before, such as the recycling and strengthening and weakening of relations between reasoning, speed, and WM at different developmental phases (Demetriou et al., 2013; Demetriou et al., 2014). The specification of cognizance as the mediator (a) that transforms basic mental experiences, such as control of attention and retention of information, into intentionally activated mental processes used in reasoning and (b) transforms inferential processes into self-regulation processes used for flexible focus highlights how executive control changes in development (Demetriou, Makris, Kazi, Spanoudis, & Shayer, 2018).

This model has implications for understanding everyday life, but also for learning and education, that go further than traditional developmental or psychometric theories of intelligence. With regard to everyday life, dramatic as it may sound, the assumption that the level of thought of the majority of the population is very much like that of a 9-year-old child, with whatever knowledge and experience is added through the years, may shed light on many of the phenomena we observe in our modern media-dominated social and political life. An example would be the uncritical acceptance of all sorts of attractive impressions or populist leadership. Thus, the theory offers a developmental explanation of the lapses of reasoning plaguing decision making in adult life that was of strong interest in various fields of psychology and other disciplines as well (Kahneman, 2011).

With regard to education, we proposed a program of thought development that would support individual development to reach the final cycle of principle-based

thought. For instance, we showed that training in cognizance of inferential processes and building mental models specific to different types of reasoning may lead individuals to attain and consolidate complex reasoning schemes that enable them to resist various fallacies in interpreting evidence and reach valid deductive conclusions, which is central in principle-based thought (Christoforides, Spanoudis, & Demetriou, 2016). In addition, we showed that this approach may significantly improve thought in specific domains, such as mathematical thought related to school, and may generalize to fundamental processes, such as attention control and WM (Papageorgiou, Christou, Spanoudis, & Demetriou, 2016). These ideas may be useful for education aiming to support intellectual development in childhood through early adulthood (see Demetriou, Makris, Kazi, Spanoudis, Shayer, & Kazali, 2018; Demetriou & Spanoudis, 2018). In a nutshell, these are the educational postulates of the theory.

First, contrary to the view derived from cognitive theories that training fundamental processes, such as attention control and WM, would generalize from the bottom up, our theory suggests that transfer of learning goes from the top down, from phase-specific general cognizance and inferential processes to specific reasoning and processing processes. This prediction allies well with recent findings that cognitive training focusing on WM failed to generalize to fluid intelligence (Shipstead, Redick, & Engle, 2012). Second, it sheds light on the fade out phenomenon that caused the failure of practically all programs that attempted to raise intelligence, such as the Head Start Program (Protzko, 2016). That is, whatever is gained in IQ scores because of an intervention almost completely fades out in about 2 to 3 years. We suggest that this is due to the fact the training programs are generally short and address mainly cognitive abilities associated with realistic representations or rule-based thought. Thus, they fail to consolidate gains through higher levels, rendering them, by definition, developmentally unstable. The model suggests four major requirements for sustainable cognitive change:

1. The worldview associated with each major educational layer (preschool, primary, and secondary) must be consolidated at the beginning of a developmental cycle and then used to prepare the transition to the next worldview: Preschoolers must acquire awareness of age-specific executive processes (e.g., attention focusing) and representations (e.g., mental images and words) and build links between them. Primary-school children must acquire insight into the mental processes underlying relations between representations, such as association and inference, and must

know their constraints in real-world problems, such as arithmetic or reasoning related to social interactions. Adolescents must grasp the formal principles constraining these processes and embed them in different contexts.

2. The complexity of concepts taught at successive school grades must be tuned to the representational possibilities typically associated with each grade. The pacing of teaching of any concept must be tuned to the typical representational and processing rate of the grade concerned. Anyone may operate at lower than his or her optimum level when first facing a new task. Thus, teaching must always start with examples demanding less than the students' optimum capacity.

3. Variations around the modal classroom rate across individuals must be respected on the basis of the individual diagnosis of each student.

4. Finally, to be sustainable, learning must recycle according to the four developmental cycles to upgrade each phase's core cognizance and relational thought processes into those of the next cycle. Recycling learning across developmental cycles would counteract increasing developmental inertia to stay at a given cycle and thus minimize fade-out tendencies that are present in any learning endeavor and that increase with the increasing complexity of the tasks involved.

These ideas are presented in several publications addressed to the educational-science community (e.g., Adey, Csapo, Demetriou, Hautamaki, & Shayer, 2007; Demetriou & Spanoudis, 2018; Demetriou, Spanoudis, & Mouyi, 2011; Greiff et al., 2014). In addition, they are presented in a booklet published by the United Nations Educational, Scientific and Cultural Organization (UNESCO) International Bureau of Education in Collaboration with the International Academy of Education (Demetriou & Christou, 2015). This booklet is addressed to educators and policymakers all over the world. Altogether, our theory is under extensive discussion as indicated by more than 4,200 citations in Google Scholar. The publications gearing on education exert significant impact on educational practice (more than 1,000 citations related to the publications gearing on education). My recent book, *Growing Minds: A Developmental Theory of Intelligence, Brain and Education* (Demetriou & Spanoudis, 2018), was included in a United Nations (UN) project aimed at building a substantial online research, teaching, and learning collection to support the delivery of UN Sustainable Development Goals focusing on inclusive and quality education for all and promote lifelong learning. The interested reader may see an overall evaluation of our

book in a recent review prepared by Pascual-Leone (2018) for *Intelligence*, the official journal of the International Society for Research on Intelligence. Hopefully our work influences the real world of education beyond publications, affecting what teachers do in real classrooms with real children.

Serving the Community

In terms of the Big Five Factors of personality, I enjoy being and working with people (high extroversion); thrive in change (high openness to experience); withstand pressure (low in neuroticism); abide by the rules as long as they are useful and otherwise try to change them (average in conscientiousness); and care for others but don't mind if am not always pleasant to them (average in agreeableness). I discovered early on that this profile is conducive to social and political activities. Others accept you and vote for you in elections, most of the time. These inclinations, together with my political interests, led me into active involvement both in the wider academic life of the university and the scientific community at large.

Psychology in Greek universities has been taught since the early 20th century but usually as part of philosophy and education. At the Aristotle University, several colleagues and I achieved the autonomy of psychology as a science only at the end of the 20th century. Specifically, we convinced the university and the state to create an autonomous department of psychology in the early 1990s, and I served as its first chairperson. At the same time, with several colleagues from all over Greece (notably Professors John Paraskevopoulos and Jim Georgas of the University of Athens), we created the Greek Psychological Society (in 1989) and launched *Psychology: The Journal of the Greek Psychological Society*. I was the first secretary-general of the society and the founding editor of the journal. Since then, these institutions have thrived in Greece. The Greek Psychological Society and its journal dominate in the Greek world.

At the same time, I was actively involved in the development of the European Association for Research on Learning and Instruction (EARLI), which started in 1985. I served as a member of its governing board for two terms (1987–1991). I was also an associate editor of its journal, *Learning and Instruction*, and the editor of *Advances in Learning in Instruction*, the EARLI book series. EARLI and its journals dominate in Europe and universally in the learning sciences.

There was no University in Cyprus until the 1980s, for political reasons—to keep bonds with Greece strong. Eventually, the University of Cyprus was established in 1992. The university was conceived as a research-oriented institution, and many Cypriot academics who were working at universities and research centers all over the world took up the challenge and returned home to help. So, after 26 years, in 1996, I moved from my alma mater, the Aristotle University, to the University of Cyprus. I started as a professor of psychology in the Department of Education because there was no department of psychology at the time. I was soon elected chairman of the Department of Education and then, 2 years later, the vice-rector of the university. I served in this post for more than 3 years and as the acting rector of the university for 6 months. The experience was great. The university developed quickly and became a respectable member of European and international academia. We created new schools and departments, new services and institutions, and established a community of scholars. I mention only one of these creations, one in which I played a very central role: I helped create a new, autonomous department of psychology, for the second time in my career. Finally, at first as a member of the Research Council of Cyprus and later as President of the Council of the Research Promotion Foundation, I helped to completely change how science was integrated into the functioning of the country.

The state decided to start a second university in Cyprus, and I was invited to become its founding president. I wavered because the demands of the job were huge in every way: academic, administrative, and political. Moreover, I was concerned that this might halt my research. Eventually, I accepted because the opportunity to create a university is very rare in the life of a professor. After all, theories are destined to vanish sooner or later; institutions may be eternal. The Cyprus University of Technology is located in Limassol, the second largest city and the main seaport in Cyprus. We designed a university to expand the possibilities for studies and research offered by the University of Cyprus in orientations and studies. This university is oriented to applied research, and it offers studies in most fields of applied science, both social and natural, and the arts. We opted for a city university, planting it in the historical center of the city, which was deserted at the time. In this way, we completely transformed the city. In a lucky combination with many other social and economic changes, we transformed Limassol into a very nice Mediterranean university town. I am happy that this university, only 14 years after it started, ascended to the group of the 60 best universities in the world (among those created in the 21st century).

Stepping Out of the Ivory Tower

High-level academic administration is political, especially in countries with unsettled national and political disputes. A rector is visible and interacts with

politicians. Thus, the road to politics is often short. This was my case. The newly elected president of Cyprus, Demetris Christofias, who won the 2008 presidential election, invited me to participate in his government as the Minister of Education and Culture. I accepted. I thought that I might contribute to bringing down the mental boundaries that divide the country and infuse something of the mentality of the cognitive developmental researcher and academic into a system dominated by local mentality for a long time.

It was the first time that I stepped out of the ivory tower of a university. The experience had both a positive and an unpleasant side. The positive side first: It is a privilege to serve in one's own country's government. On the human side, it offers honors that would please every mortal. On the political side, no one can really understand how a state operates unless she or he sits around the cabinet's conference table and participates in the decisions governing a country. Moreover, it is very educational to learn the game of negotiating and balancing between all stakeholders and institutions: Political parties, unions, and institutions (e.g., the church and the media) are all part of the daily game. To implement actions and decisions, the minister needs to juggle many balls. In addition, it opens possibilities for doing things that no other post would allow. During my term, we reformed the curriculum of every school subject, from preschool education to high school, and we changed many structures in the Ministry of Education and Culture. Happily, a large part of the curricula and the new structures installed are still in place and developing, despite the fact that four new ministers have served in office since I left.

On the negative side, the road from decision to implementation is very long. At any moment, even under the best of intentions on the part of a government, decisions about education are disputed and challenged by other stakeholders, agents, or institutions in society. In a sense, political conflict about educational policies originates from a fear on the part of forces opposing the government that education is used as a disguise for the long-term settlement of current political issues in the direction of the political party in power. Introducing new curricula may be a casus belli for many. History or language wars are common in countries in which national or international disputes still linger. I had my own history war and survived, with some casualties. Mental boundaries are very difficult to bring down, especially when defended by brainwashed zealots led by populist politicians.

Apart from politics, bureaucracy may be a hindrance. Modern systems of education are vast systems of bureaucracy. They are governed by laws and regulations that are frequently at odds with one another. In addition, education is served by a very complex administrative structure, involving multiple layers. Administrative bureaucracies are constrained by their habitual ways of dealing with problems. When the pace of change is faster than they can absorb, they will try to halt the change. Hidden agendas are frequently present. These come either from within the administration itself, when a proposed change endangers the power balance within the system, or from connections between the administration and agents in the society that oppose the government. Implementation of policies is often derailed skillfully and imperceptibly so that no one really knows why things remain stagnant.

Academics may not realize that, no matter how demanding the world of academia is, it is a world of saints compared with the wild world of politics. In academia, we care for the truth—at least most of the time, especially if it is not concerned with internal academic politics! In politics, the truth does not normally count for much. In academia, we praise the accomplished. We promote and give awards and medals, we bestow honorary degrees, and so forth. In politics, you are always considered wrong by the opposition. In academia, we understand that recognition may come after decades of work on a problem, if not posthumously. In politics, they want things done now, if not yesterday. Despite its shortcomings, evaluation in academia is systematic and generally fair. By contrast, in politics, it is based on popularity, as controlled by the media, and frequently on underground interdependencies of various sorts of interests. People in politics, in the economy, and the media strive for power, profit, and popularity. Their interdependencies are variable and often underground. As a result, violations of "principles" and morality are common, and even the violation of the law is not uncommon. Staying untouched takes guts and alertness. Surviving is a feat. Succeeding is a miracle.

The international aspect of a minister's job is definitely an asset. In a European Union (EU) country, the experience is very instructive. Participating in the Council of Ministers of Education, Culture, and Sports was a powerful educational experience at many levels. Most important among these were (a) getting to know how other countries address and solve their problems and (b) participating in the historical process of European integration. For obvious reasons, decisions or education are optional and advisory for the countries rather than mandatory. This process is at its early beginnings, and it is guided by goals (both explicit and implicit) that may conflict with national priorities. For example, the goal for the creation of a "European citizen" is often received with caution and mistrust by people and organizations in many European countries. There is as yet no commonly acceptable answer as to how (or by how much) a European identity should be integrated with

a national or a local identity. As expected, answers to these questions vary depending on the history, the culture, the local conditions, and the size of each member state. Taking positions on these issues is not an easy matter for European Union Ministers. It is thus highly demanding for a minister to operate as a bridge allowing constructive exchanges between a particular country and a supranational system such as the EU.

Conclusion

I became a professor emeritus in 2017 because, in Cyprus, we have forced retirement at the age of 67. I can thus reflect on goals set several decades ago. Specifically, to be useful to science, I attempted to advance a theory of intellectual development that would be useful to education. The theory is there to be evaluated. The journey was extremely rewarding; more than 20 young researchers worked with me for their graduate studies, many of them now full professors all over the world, including China, Nigeria, and several countries in Europe. The lesson learned: Discovering and highlighting new phenomena takes time, persistence, openness to new ideas and learning, and cooperation with talented and dedicated young colleagues.

To be useful to academia, I spent much of my professional time for the creation and development of academic institutions, including psychology departments, universities, scientific societies, and journals. The lesson learned: Contributions to the creation of academic and scientific institutions are like mosaic construction; huge numbers of people lay their little stones over time. With time, the mosaic expands and remorphs; some stones may be removed, only to have other stones placed in their place that fit better with the changing image. Thus, at any time, it is better to see the whole picture than look for your own stone.

To be useful to the community and society, I spent 4 hard years as the Minister of Education and Culture, trying to transform the education of my country. The lesson learned: Social and political institutions are always resistant to change. To make a difference it takes power of will, persistence, resilience, and flexibility, so that changes in tactics forced by opponents will not annihilate the long-term strategic goal. But even when a goal is attained, it may be cancelled by your successors, because political processes express social and historical forces that often cancel each other out in endless cycles of detours and returns.

Action Editor

Marjorie Rhodes served as action editor and June Gruber served as interim editor-in-chief for this article.

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