Education from a Whiteheadian Point of View

Education from a Whiteheadian Point of View:

Process, Rhythm, and Poiesis

Edited by

Vesselin Petrov and Adam C. Scarfe

Education from a Whiteheadian Point of View:
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Approaching Education From a Whiteheadian, Process-Relational Point of View

Vesselin Petrov

Theorizing in relation to education is an essential task both in the social sciences and humanities. At present, there are numerous theories of education that have been suggested by philosophers, psychologists, and specialists in education, many of which having their basis in some classical philosophical theory (including its respective ontology and epistemology) stemming out of the Enlightenment. Generally, they can be grouped in the following way: (a) theories connected with behaviorism (e.g., having their basis in Hume's radical sense empiricism); (b) theories connected with cognitivism (e.g., having their basis in Kant's transcendental philosophy); and (c) theories connected with radical constructivism (e.g., which have Berkeley's radical idealism as their foundation). In general, these theories, with their positive and negative aspects, are considered to be mutually exclusive. That is why an important aim in the contemporary theory of education is to find a proper philosophical methodological framework, that combines the positive sides of the available theories, and, at the same time, escapes their disadvantages. Attempts to find adequate methodological frameworks for education largely began in the early twentieth century. One possible candidate for adoption by teachers is Whitehead's philosophy of education.

Alfred North Whitehead (1861-1947), who is known generally for his work in mathematics and philosophy, articulated his ideas concerning education in lectures that were first published in 1917 in the book, *The Organization of Thought*. These were later reprinted without edit or introduction, along with some new chapters, in *The Aims of Education and Other Essays*, which was published in 1929. In these works, Whitehead discusses the purpose of education, the role of a university, and the

importance of science. Consistent with his overall cosmology, as set forth most notably in *Science and the Modern World* (1925), *Process and Reality* (1929), and *Adventures of Ideas* (1933), a chief goal of his philosophy of education involves waging a "protest against dead knowledge, that is to say, against inert ideas."[1]

The present volume presents critical analyses of Whitehead's philosophy of education and the manifestation of its general principles across the globe. Despite nearly a century, Whitehead's criticisms of educational practice are as applicable as ever. Globally, educational policy, pedagogy, and philosophy often fail to articulate a view that "the students are alive, … [that] the purpose of education is to stimulate and guide their self-development,"[2] and that "the teachers also should be alive with living thoughts."[3] As such, the goal of the present volume is to investigate Whitehead's philosophy of education critically, as well as to integrate his point of view with contemporary pedagogical thinking and educational practices across the globe.

The authors of the various chapters in this volume take up the task of demonstrating how Whitehead's theory of education, which is consistent with his overall process ontology and theory of perception, can be brought together with other theories of education. Another task is to investigate the contemporary attempt for the further development of process philosophical theory of education. And a third task is to outline some ways in which the main tenets of Whitehead's process philosophy of education can be applied in practice. The goals and tasks of the volume mark its structure. It is divided into two parts, each consisting of several chapters. Part I is devoted to the first two of the above formulated tasks and Part II is devoted to the third one. All of the chapters in this volume initiate unique investigations in relation to the above-formulated tasks and their creative thinking throws new light on contemporary education.

Chapter One, "The Art of Free Society," by George Allan, endeavours to outline some important conditions that make a free society possible. According to the author, these conditions are connected with the stage of generalization in Whitehead's rhythm of education, as distinct from the phases of romance and precision. The chapter begins by differing between educating and schooling, interpreted as a tension between social tradition and the aims of the group, on the one hand, and the goals and inventiveness of the individual, on the other. This tension is usually resolved in favor of the group. However, the author points out that Whitehead can help us to understand how the subjugation of individuals to groups arises and how it can be resisted. Specifically, this can be achieved by learning how to combine the curiosity of romance with the orderliness

of precision in the stage of generalization. In this way, the clash between established tradition and bold innovation can become a creative tension. One looming problem pertains to the question of how people can develop habits of feeling and thinking that will result in a propensity to make wise judgments and to undertake actions necessary for a society's good health. For Whitehead, this ideal is central to the constitution of a "free society" and the process of putting it to use—which is an "art." But, today, human communities seem far removed from that ideal.

Employing Whitehead's theorizing about the nature of symbolism, Allan explores the importance of symbols in the creation of self-determining individuals. The author explains how such creative work can become destructive, and how our quest for individual freedom can result in its repression. Some keys to understanding how Whitehead thinks symbols function in the creation of self-determining individuals involve his notion of "the bare 'It'"[4] and what he calls "transmutation."[5] Aesthetic symbols are considered first. They are not limited to works of art only. Our everyday experience is rife with similar distillations. Almost any symbol can become an aesthetic symbol. Next, scientific symbols are considered. Like aesthetic symbols, scientific symbols distill a multitude of particular experiences into a single meaningful symbol. However, unlike aesthetic symbols, scientific symbols involve abstraction and exclusion. They simplify an experience by ignoring its non-quantifiable features. Scientific symbols create closed systems. As new methods emerge or as conditions change, the closed system can no longer cope with them adequately. This is not a problem for science, but rather an opportunity, for scientists can elaborate a new, more adequate system, with new symbols and new meanings.

Allan uses Whitehead's notion of "the bare 'It'" to explicate the difference between aesthetic symbols and scientific symbols. He emphasizes that schooling is the mode of learning that is suited to scientific endeavor, because it emphasizes the importance of closed systems, including the organization of information and ideas into disciplines that are defined by specific methods and a distinctive vocabulary. In contrast, educating is the mode of learning that is best suited to aesthetic methods, because it emphasizes the importance of unsystematic exploration and the non-quantitative skills of imagination and insight this requires, the capacity to see things afresh from an unexpected standpoint, involving both seeing things that are different as the same and things that are the same as different. Finally, the author explains how Whitehead thinks that we can break away from the powerful grip of closed political systems, and why it is so important that we do so.

Allan emphasizes that the more we have freed ourselves from blind acceptance of our cultural heritage the better able we are to reform the symbols comprising that heritage. But the constant revising also requires effective social institutions, including schools that teach students their societal heritage by educating rather than indoctrinating. Furthermore, the greater that societal resources are available, the greater is a person's ability to become self-determining.

Chapter Two, "Can One Teach Creativity?," by Michel Weber, is devoted to analysis of the conditions for the possibility of teaching in general, and of teaching creativity in particular, as is seemingly emphasized by Whitehead. It also considers the historical context of schooling as well as the economical urge to explore the territory of teaching. The author stresses the important place that the notion of creativity occupies in Whitehead's ontology. Weber tries to explain the problem of teaching creativity in three steps, and he takes up the question of what it means to teach a subject or a skill. The author first approaches these questions by way of an historical approach, from the Palaeolithic and Neolithic epochs up until the present day. Weber traces the historical conditions in which schools were born and he stresses that, today, schooling commonly amounts to commodification and certification. To be sure, today, most degrees have no value, no one is supposed to be able to learn by oneself, and business corporations benefit from the outsourcing of training and from programmed obsolescence. From here, new questions arise concerning the purpose of the contemporary school: should school raise, train, or set free? What do we learn from the difference in terms of the overall *modus operandi* behind upper and lower classes, respectively? The author explains that there are two basic possibilities that have appeared concerning the struggle between humanism and utilitarianism: first, to teach, i.e., to introduce a subject or discipline, and second, to train, i.e., to help someone to obtain a skill, or to learn a profession or trade. Whitehead's own views on these problems are outlined. According to him, education should aim both at culture and at expertise: it should be both humanistic and utilitarian. For him, the goal is to obtain a "living knowledge," which means a knowledge that allows you to cope with the living universe. For Whitehead, one should teach by respecting a rhythmic pattern made up of cycles of romance, precision and generalization.

Concerning the concept of creativity, the author distinguishes a weak and a strong concept: the weak concept understands creativity as metamorphosis or transformation of a pre-existing substratum, whereas in the strong concept, creativity involves innovation, difference, or freshness. The weak and the strong concepts underline the difference between simple

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alteration or renewal and genuine novelty. The former qualifies a bare configurational change within a given pattern; the second names the bursting forth of the unprecedented, of that which has no reason. However, the two categories are not to be viewed as completely antagonistic toward one another. Rather, it is efficacy and repetition that introduce a causal depth to pure creativity. The power of efficacy is creativity's scaffolding.

Next, Weber focuses on the problem of teaching creativity. He observes that, on the one hand, mass education only offers a very debased tutorial system and an equally old-fashioned, but efficacious, apprenticeship. On the other hand, the weak concept of creativity (*qua* transformation or metamorphosis) does not do justice to the strong Whiteheadian concept (*qua* epochal theory). At best, mass education allows creative teaching and teaching creativity only in the weak sense, whereas the tutorial system could foster some form of creativity in the strong sense. When the mind is seen as a vessel, a double passivity follows: both the teacher and the student are passive. If, on the contrary, the mind is interpreted as a fire, a double activity ensues: the teacher is like a match and the student is akin to a powder. In conclusion, the author emphasizes the principle of "living knowledge," which presupposes the interrelatedness of humans, humans and animals, and of all creatures and nature. Consideration of the process of organic growth leads directly to a consideration of the rhythmic cycles of growth or pulses of life as well as of the notion that education involves guidance toward a comprehension of the art of life.

The aim of Chapter Three, "Holism and the Metaphysical Basis of Whiteheadian Education," by Vesselin Petrov, is to systematize some existing investigations of the metaphysical basis of Whiteheadian education and to formulate new principles, connections, and similarities in this regard. The chapter begins with a short review of previous investigations of the influence of Whitehead's metaphysics on his theory of education. Many aspects of that influence have been illuminated, but as Whitehead himself has pointed out, "for each succeeding generation, the problem of Education is new,"[6] such that the theme is never exhausted. The new aspect that is highlighted in the chapter is connected with the category of "holism" in Whitehead's metaphysics and its relation to his educational philosophy. In most of his mature works, Whitehead does not solely focus on the topics of cosmology or metaphysics, but he also writes about the history and development of human civilization. However, an inseparable part of this picture of civilization is the topic of education. So, issues pertaining to education are an inseparable part of Whitehead's

metaphysics: the universe is an organism and education is one of the functions of that organism.

Next, the author argues that education offers a remedy for periods of cultural crisis and uncertainty in human civilization. This function of education is closely aligned with Whitehead's holistic metaphysical vision. The author suggests that Whitehead's cycles of romance, precision, and generalization not only pertain to education, but also to the process of generating knowledge about the world. Petrov defends the thesis that the metaphysical structure of the universe has the same character as educational structure: it consists of greater cycles and their minor eddies. The chapter also considers some of the features that Whitehead's educational thought and his ideas regarding the development of civilization have in common. Their similarity is due to the basic metaphysical ground of both spheres: the development of humankind resembles the development of a child—in antiquity, it was its period of romance; later in the middle ages and nowadays, it was its period of precision; and the period of generalization in relaton to humankind is still in the future. Overall, the central contribution of the chapter is its provision of an argument for the claim that Whitehead's theory of education is an application of his general metaphysics. We can definitely say that education and metaphysics start from the same given groundwork of immediate experience, but, in the main, they proceed in opposite directions in relation to their diverse tasks.

Chapter Four, "The Role of Ontological and Cultural Memory in Education," by Maria-Teresa Teixeira, is based on the presupposition that memory is at the root of any educational system. The word *memory* can be taken in different senses: in a cultural sense, as the capability of human communities to remember and preserve memories; and in an ontological sense, as a foundational principle in the constitution of being. The chapter begins with a discussion of the problem of the erosion of memory. Every political system is based on a complex narrative that resorts to memory in some way, either by the enhancement of cultural pride or by the erosion of the memory of the past. Erasing memory is a first step toward the establishment of totalitarian rule, and for implementing indoctrination over authentic education. The author gives examples of some twentieth century philosophers who have had recourse to ontological memory in order to try to make sense of the novel forms of evil that have emerged in contemporary times. Ontological memory is constitutive of being a synthesis that unites and fuses the elements of experience. Crimes against humanity are unforgivable mainly because humanity does not have the capacity to forget them, but also because they contradict human nature in

its essence. Philosophers have also introduced the concept of cultural memory. Cultural memory is something that, in spite of being far removed from everyday life, secures cultural continuity, because it preserves a collective past as the foundation for a common cultural identity. We can also include schools and universities, as well as their curricula, as illustrations of the institutional manifestation of cultural memory. Memory has an ontological role in so far as it constitutes and maintains its form through symbolism. The symbol works as an instrument of orientation that can approach divergent cultures by recognizing and reintroducing form throughout the ages. In this way, we are led to the idea of "social memory." However, in twentieth century process philosophy, the retrospective influence of the present on the past is a major philosophical theme. The present, in influencing the past, builds up what the past should look like. According to Teixeira, whatever is convenient for our societies can be legitimated by the mechanism of anticipation. This kind of legitimized memory is social memory, and it can perpetuate culture in different ways throughout the ages. It expresses itself through narrative, representations, and symbols. It includes literature, art, science, and architecture. This kind of social and cultural memory is secondary, retrospective, and repetitive. Only ontological memory is capable of unification, thus constituting being.

The author analyzes Bergson's views on memory, emphasizing their process philosophical character. She concludes that this kind of memory has an ontological character, because it is constitutive of being. Being is the result of this integrative ontological process, and the ontological nature of memory is closely related to the being it engenders. She stresses Bergson's view that memory is contemporaneous with the present, not only when referring to identity, but in relation to the formation of perception. The concept of ontological memory can be paired, in relatively easy fashion, with the concept of cultural memory. The process of formation and preservation of cultural memory has an indeterminate and qualitative facet. From its ontological roots, memory will constitute form and give rise to symbolism. Cultural memory becomes more representational and it also becomes a retrospective memory that changes and recurs. Through retrospective memory, memory can even misrepresent the truth, giving itself a retrospective illusion. As such, it is an essential tool in education.

Next, Teixeira considers the question of the relation between education and ontological memory and cultural memory. Educational systems and curricula are always based on an earlier culture, whether they try to preserve and develop it, or they try to reject and destroy it. But,

ontological memory emerges as the most important foundation upon which the child's character is formed and a society's identity is built up; it is also the basis of cultural memory. The author emphasizes that the shortcoming of our educational systems have a common origin in our common Greco-Latin culture. They are hard to reject, because they are an integral part of our cultural memory, which is deeply rooted in the cultural character of our societies and of ourselves. Educational authorities and governments consistently take advantage of these deeply ingrained cultural habits and reintroduce these methodologies again in curricula. So, cultural memory is frequently used to reiterate past mistakes. But, in school curricula, some subjects are very relevant to cultural memory. History is perhaps the most obvious one. However, the eradication of cultural memory can lead to a great lack in relation to ontological memory. The author considers the connection between language with memory, and she observes that the constitution of language is the constitution of an advanced kind of ontological memory. Language is a vehicle that carries ontological memory along with it. Knowledge and culture are based on language. And therefore, language is the "backbone" of civilization.

Teixeira concludes by suggesting that the rapid destruction of whatever is left of our diverse cultures erases ontological and cultural memories. Cultural memory is the backbone of any educational system; it is the basis for the preservation of culture. Ontological memory is irrevocable because it impedes forgetfulness. It is not a human faculty. Rather, ontological memory coincides with the constitution of being, and, thus, cannot be erased from existence.

Chapter Five, "The Quantum of Education," by Aljoscha Berve, starts by asserting the premise that, as a philosopher, Whitehead began with a keen interest in education and then he moved on to cosmological theory and metaphysics. The aim of this chapter is to argue that the topics that are fundamental for Whitehead in his writings on education reappear in his concept of metaphysics. It begins with the idea that Whitehead's notion of the "actual entity" (his abstract metaphysical monad), functions as the cosmological embodiment of his notion of the scientific method. There is an analogy between the process underlying the scientific method and the ontological structure of the basic building blocks of reality according to Whitehead. The author seeks to demonstrate that Whitehead's early writings on education show an implicit notion of process that prefigures the meaning of this concept in his later metaphysics. So, he thinks that the dynamic of anthropomorphizing in Whitehead's system of thought has to be examined before the notion of process in his writings on education can become the subject of analysis. This is why Berve moves to consider the

de-anthropomorphizing of experience. A methodological difficulty with Whitehead's replacement of morphological description with a description of dynamic process is pointed out. The problem stems from the insistence that all real existence is correlated to microscopic actual entities. There is a scarcity of references to volition and responsibility in Whitehead's outline of the philosophy of organism. With a concept of nature consisting of interlocking and discrete, dynamic processes, it is difficult to explain the phenomenon of personal identity. Therefore, it might be better to approach Whitehead's metaphysics from another direction. As alluded to above, one main structural analogy to the metaphysical notion of process embodied in the concept of the actual entity originates from scientific method. There is sufficient ground to argue that Whitehead's lifelong occupation with the process of learning comprises another structural analogy to his process metaphysics.

Next, the author considers educational processes, because he thinks that before taking a detailed look at the structural similarities between educational processes and the process of concrescence that Whitehead describes within his overall process philosophical scheme, it seems sensible to begin by looking at the broader notion of process in Whitehead's views on education. In fact, Whitehead does not rely much on the term of "process" in his book, *The Aims of Education*. Rather, he talks about "rhythm," various "stages" comprising the "cycle" of learning, the necessity of the "organization of thought," and so on. However, even in his early writings on education, Whitehead's interest is to provide a general overview. Rather than concentrating either on particular details or on general structures, education should try to incorporate both aspects by way of a dynamic process leading from the many details to the one general theory. In Whitehead's thought, there is an obvious link between the scientific method and both metaphysics and education. For Whitehead, school is the defining unit of education. If learning is to be more than a mere accumulation of detailed inert ideas, then there has to be a holistic or general perspective outlining the attainment of satisfaction that a process of unifying intends to lead. Therefore, the school as a unit is exactly the quantum of education that the pupil is supposed to master. Structuring the experience of our lifeworld by way of the notion of rhythm provides Whitehead with a paradigm for the interpretation, not merely of learning and education, but of life in general. The author makes a comparison between Hegel's three-step dialectical process, involving moments of: thesis, antithesis, and synthesis, and Whitehead's rhythm of education, with its stages of romance, precision, and generalization. The process of learning does not form a sequential process. Instead, the three stages form

a cycle that issues in further cycles. As such, we have to stop considering learning as one continuous process that aims at one final goal.

Last, Berve considers the notion of process both in education and in metaphysics, in order to analyze whether the similarities between the two reveals a common deep structure. He first points to the rhythmic structure of both as the most obvious correspondence. According to him, a unifying thread connects Whitehead's idea of rhythmic process to scientific theory, education, and metaphysics. While the metaphysical process of the many distinct entities forming the one new synthesis of the universe is supplemented by the process of perishing, whereby the one is objectified and becomes one among the many entities of the past, the cycle of learning works similarly. Both the process of education and the metaphysical notion of process can be said to describe mereological dynamics. Another assessment of the rhythmical structure of these processes concerns their relation to common sense. Starting from, and returning to, common sense is analogous to an actual entity starting from the immediate prehension of the world of facts and returning to objectivity by becoming a superject after reaching its own satisfaction. The final similarity between the process of education and the metaphysical notion of process lies in their teleological structure. Processes do not simply happen, they are the dynamic by which a subject realizes its intention and thereby reaches its satisfaction. In conclusion, Berve tries to answer the question of whether it is safe to deduce that Whitehead's thoughts on education had a substantial influence on his metaphysical scheme. He gives two main reasons for an affirmative answer: first, not only are the dynamics of process in the contexts of education and metaphysics eerily similar, but the comprehensive idea behind the theories seems to be the same as well. Second, there is good reason to interpret Whitehead's philosophy as a system of analogies, creating a network of mutually supportive, structural explanations. Therefore, it seems justified to refer to the cycle of learning as the "quantum of education."

Chapter Six, "The Cultivation of Aesthetic Intensity: A Whiteheadian Philosophy of Education," by Alexander Haitos, emphasizes the theme of "aesthetics" that is found in Whitehead's educational writings. The author defends the thesis that the aesthetic dimension of Whitehead's philosophy opens up a pathway between his metaphysics and his ideas concerning education. Haitos has chosen to focus on aesthetics, because in many of Whitehead's discussions of education the importance of "aesthetic apprehension" is frequently mentioned, and because in his metaphysical writings the importance of aesthetics is pervasive. The author first explains what should be understood by "aesthetics" in Whiteheadian terms.

Generically, the notion of aesthetics involves a reference to what characterizes any composition of a one from many. Aesthetics penetrates to the level of metaphysical description. It is through aesthetic composition and comparison that layered rhythms of process generate various systems of order and culture.

The chapter begins its investigation by considering education as a vitalizing process. The author takes life as a central notion in the relationship of aesthetics and education. The picture of life as aesthetic composition requires freedom, creativity, and spontaneity of decision. The aim of education is to aid us to preserve life and its creative impulse in our engagement with the environment. More than this, education *enhances* life, *vitalizes* experience, infuses it with possibility, and broadens the realm of action, thus giving us a modicum of control over fate. However, reason is bound up with novelty and imagination in the aesthetic self-creation of an occasion of experience. Education is the disciplining of reason. Whitehead associates reason with life, energy, and adventure.

Haitos stresses that effective education requires discipline, but not in a manner takes discipline to excess. What is needed is an unwavering commitment to freedom and to imagination. The ideal way for freedom to be maintained in the face of discipline is for discipline to emerge as the "voluntary issue of free choice."[7] Pupils are alive, and, as such, each harbors an impulse towards self-development. In relation to the aesthetic terms that were introduced earlier in the chapter, this impulse is directed towards higher and more inclusive levels of aesthetically satisfying and fruitful experience. Creativity and imagination cannot be taught directly, and initiative cannot be delivered to the student as if it were a package. Rather, teaching should be preparatory and theatrical, that is, it should entail a preparation of the environment around the ideas one wishes to convey, and an exhibition of the power and imaginative potential of these ideas by the teacher. Effective education requires *style*, or an aesthetic sensibility that encompasses student tractability and the content under consideration. The aim of the teacher is to show that imagination and freedom are compatible with, and indeed can flourish under, the right kind of discipline. Education is not merely a formal endeavor of book learning or absorbing university-grade technical detail. On the contrary, for Whitehead, the fundamental aim of education is the promotion of life in all of its aesthetic variety and intensity.

Chapter Seven, "The 'New Frontiers' of Biology and Learning, Teaching and Researching in the Whiteheadian Vein," by Adam C. Scarfe, inquires into the potential objective bases of Whitehead's doctrine of the rhythm of education, which involves phases of romance, precision, and

generalization. He finds that a group of research domains, which to some extent emphasize holism and go "against the grain" of the dominant, mechanistic neo-Darwinian orientation in biology, can help to provide an objective ground for Whitehead's theorizing concerning the notion that there is a rhythm of learning that educators must be aware of, and must attend to, in the course of their teaching if their assistance in student self-development is to be "successful." Specifically, Scarfe argues that homeostasis research, chronobiology, and autopoiesis, together, can serve to ground Whitehead's descriptive and prescriptive claims concerning the rhythm of education.

Homeostasis involves the notion that living organisms are bounded by a semi-permeable membrane which partially separates its internal milieu off from the external environment. The bodies of living organisms purposively orchestrate processes of reversion and negative reversion from, and to, states of excess and deficiency, so as to attain and preserve a mean state. Homeostatic processes serve to maintain the "far-from-equilibrium" stability of this internal milieu, enabling the organism to persist in a living, functioning state, rather than succumbing to the forces of entropy. Chronobiology is the study of biological rhythms or cycles, such as circadian rhythms. There are both endogenous and exogenous biological rhythms, and this domain also studies their interrelation. Chronobiology adds that the steady states, which are aimed at in homeostatic processes, are themselves subject to change, namely, oscillating and/or vibrating. Scarfe suggestively locates Whitehead's doctrine of the rhythm of education within the objective context that is provided homeostasis research and chronobiology. He discusses some important practical aspects of bringing the findings of these scientific disciplines to bear on learning, teaching, schooling, and curricula.

Next, Scarfe argues that the contemporary notion of *autopoiesis* (Gr. self-creation), which stands for the notion that living organisms, unlike inanimate entities and machines, organize the production of their own components in a purposive fashion, their members (e.g., cells, tissues, organs) working in interdependent manner with other members for the sake of the persistence of the whole in the face of entropy. He advances the notion that *autopoiesis* is an objective ground for the Whiteheadian idea that education primarily involves teacher-assisted research toward self-development. Citing the works of Paulo Freire, Charles Darwin, James Mark Baldwin, Jean Piaget, Julian Huxley, Daniel Dennett, Francisco Varela, and Daniel Nicholson, and considering how mentality and language must have emerged in the evolutionary past, Scarfe advances the concept of "mental autopoiesis," a notion which is thoroughly

intertwined with the aforementioned "physiological autopoiesis." For Scarfe, "mental autopoiesis" describes the self-creating, agential, and rhythmic, and dialectical adventure that is intellectual self-development. Because homeostasis, chronobiology, and autopoiesis, together, demonstrate that students are living, prehending subjects, who are are agential bearers of intrinsic purposiveness rather than inanimate entities or "machines," from an ethical standpoint, they may be said to have intrinsic worth that ought to be respected. As such, for Scarfe, one important way that teachers can respect the agency and/or the intrinsic worth of their students is to embrace what he calls "a consensual curriculum selection in the emancipatory interest," which enables students to help select curriculum contents in conjunction with their teachers. This helps teachers to avoid the "banking model of education" that Paulo Freire was so critical of, which basically treats students as passive "machines" that need to be inputed, from without, with inert, unchanging, and unchangeable data, which must be regurgitated, rather than critically scrutinized, on exams.

Having demonstrated that homeostasis, chronobiology, and autopoiesis research present plausible, objective bases for Whitehead's philosophy of education, Scarfe continues on with his analysis of the "New Frontiers" of biology as they relate to education. Specifically, he takes up the the research of Conrad Hal Waddington, the so-called "father of epigenetics," epigenetics being another of these "New Frontiers." Waddington was heavily inspired by Whitehead and he employed Whiteheadian notions in his scientific research, including in his "genetic assimilation" experiments. Epigenetics is the holistic study of the various relations between genes, phenes, behavior, and environment. Specifically, epigenetics involves the notion that an organism or person's experience, behavior, way of life, and their environment can effect biochemical changes that can, in turn, alter gene expression in ways that can be inherited. Because the decisions that students will make over the course of their lives as regards to their values, behavior, lifestyle, and the environment, are greatly informed by their education, and such decisions may have epigenetic consequences that will impact on their health (e.g., the growth or suppression of cancer tumors), on the inheritance of their children and grandchildren (e.g., having a propensity for cancer to some extent as a result of their parents' or grandparents' lifestyles), as well as on the environment, education takes on tremendous biological significance. Following Waddington, Scarfe advances the notion that many epigenetic processes are homeostatic and bio-rhythmic in nature, and further, that development itself is an homeorhetic process. Scarfe then analyzes Waddington's stance in relation to Julian Huxley's thesis that education comprises humanity's new

"psycho-social," or alternatively, "socio-genetic," mode of biological inheritance beyond the "rawer" biological struggle for existence that most other living organisms are engaged in, namely, that involving natural selection acting on genes / genomes and the exigency of adapting successfully to the environment.

According to Huxley, the gradual, yet cumulative, transmission of learning from generation to generation over evolutionary time, via education *qua* humanity's "psycho-social" / "socio-genetic" inheritance system, has enabled humanity to surpass the capacities of all other organisms on the planet. Waddington agrees generally with Huxley's thesis here (although he would prefer to indicate that education ought to involve a "creative" transmission of learning), as well as his notion that education is an *epigenetic phenomenon*. However, Waddington is in tacit disagreement with Huxley's assertions: (1) that humanity should exert its selective agency so as to take control of all biological processes on the planet; (2) that it ought to attempt to transcend its current capacities; and (3) that education should be reformed into a function of evolutionary humanist ideology, eugenics, and transhumanism. This is especially because Huxley's orientation in relation to education diminishes the ethical foundations of this new "socio-genetic" inheritance system, thereby rendering it unsustainable. It damages the teacher-pupil relationship in that it treats students as means only to these ends, rather than as having selective agency and *intrinsic worth*. Instead, Waddington calls for the cultivation of "biological wisdom," involving critical moral deliberation that serves to strengthen the foundations of education in the sense of being humanity's "psycho-social" inheritance system. Scarfe associates this Waddingtonian notion with his own evolutionary-environmental ethic of "critical pan-selectionism." This ethic stands on the premise that living organisms are *agents* of natural selection— contributing to the elimination and preservation of other creatures—rather than just objects upon which it acts. It suggests that human beings, who are the most powerful, selective agents on the planet, ought to engage in critical moral deliberation and holistic reflection in relation to their selective activities and their behavioral selections. This is so as to leave the door open to the widest range of evolutionary possibility going forward.

Last, Scarfe takes up Waddington's outline of a four-fold model of the "rhythm of scientific research," involving phases of: (1) *curiosity and imagination*; (2) *ratiocination and logical analysis*; (3) *manipulative experimentation*; and (4) *humble generalization*. This model was inspired by Whitehead's rhythm of education and works on the Whiteheadian premises that researchers are learners and that learners are teacher-assisted

researchers. Above all, in respect to his model of the rhythm of research, it is clear that Waddington sought to incorporate a phase of holistic reflection into the scientific method, which could help, for example, to lay bare the abstractions that are created by mechanistic neo-Darwinism's reductionist approach to the study of living organisms in the two previous phases. In turn, the incorporation of a "phase of humble generalization," involving holistic and ethical reflection, into the scientific method, strengthens the foundations of science and of science education in general. And, it also enables, for intance, the recognition of the untargeted effects that may come as a result of the employment of technologies and/or biotechnologies that are generated in the research's wake, i.e., in applying its findings. In short, the incorporation of the "phase of humble generalization" places emphasis on the cultivation of "biological wisdom" in science and in science education, in an era of health, rapid technological expansion, ecological crisis, and great concern about health and healthcare. Scarfe's chapter concludes Part One of the volume on the theoretical aspects of Whitehead's process-relational philosophy of education.

Chapter Eight, "Whitehead on Emotions in Learning—Theoretical, Historical, and Empirical Aspects," by Franz Riffert, Gerda Hagenauer, Josef Kriegseisen, and Alexander Strahl is the first chapter of Part Two of the volume which focuses on the practical aspects of Whitehead's philosophy of education. That said, it connects the discussions of the theoretical aspects and the practical aspects. The chapter is focused on Whitehead's cycle-based approach to learning and teaching and his stress on the role of emotions in learning. It also presents some of the results of a study concerning the effectiveness of this approach in science teaching. The chapter begins with a description of Whitehead's idea that the imparting of inert knowledge is not sufficient in education, especially given that, living in modern societies, we are confronted with numerous changes and challenges. Whitehead claims that the new situation is calling for the radical reform of contemporary education, and he proposes a new concept of learning: the learning cycle approach. One of Whitehead's deepest intuitions is that all of reality is subject to rhythmic pulsation, learning being no exception from that. The new concept of learning consists in a sequence of three phases: romance, precision and generalization. The authors of the chapter explain the meaning of each of these phases and they point out that Whitehead placed a great deal of emphasis on the first phase of a learning cycle: romance. This is so, because of the role of emotions in learning. The authors concentrate on the connection between these phases of learning and Whitehead's theory of

perception. According to Whitehead, there are three modes of human perception: causal efficacy, presentational immediacy, and symbolic reference, the first of which is essentially emotional. Emotion is at the basis of human existence. So, if emotions are excluded from learning, the very natural basis of life is excluded and the inevitable result would be inert knowledge.

The authors comment on the historical influences that contributed to the emergence of the learning cycle approach in education. They trace the web of influences between the originators of the cycle-based concept of learning (among them Johann Friedrich Herbart, John Dewey, and Jean Piaget) as well as Whitehead. They argue that new ideas shaping a novel paradigm in education were "in the air" in the early-to-middle portions of the twentieth century, Whitehead being one of this new orientation's chief contributors. The authors also stress that the proponents of Gestalt psychology played an important role in the development of these new ideas and that there seems to have been an exchange between Gestaltists and Whitehead. The chapter demonstrates that there have been all sorts of historical channels of influence and of interchange between notable thinkers who were, in one or another, related, in that they were working on the challenging task of bringing forward a paradigm shift away from materialism and toward organicism.

In the second part of the chapter the authors concentrate their attention on measuring the effects of the learning cycle approach in terms of the learning and the emotions of students. They present the results of two-year study of the effectiveness of the learning cycle approach to teaching in physics and chemistry. The authors have found empirical ways to test Whitehead's speculations concerning the positive impact of learning cycle teaching on students' emotions. This marks the transition from the first to the second part of the present volume. The authors lay out their research design, the characteristics of the data sample, the dependent variable, how they arrived at their measurements, and they also comment on the methods by which they inputed their data. In combined fashion, joy, pride, interest, and boredom are some of the factors that were considered in forming a scale of positive emotions. In order to test whether the learning cycle approach evoked different emotions in students, a multivariate analysis was conducted. As predicted by Whitehead's learning cycle theory there are significant differences in terms of student responses in the romance phases of learning cycle one and that of learning cycle two, and in the generalization phase of both learning cycles. These crucial differences clearly confirm Whitehead's claim that positive emotions would be enhanced by the learning cycle approach in the romance and

generalization phases (the latter, according to Whitehead, entailing a return to romance). In sum, the presented data confirm Whitehead's speculations concerning the impact of learning cycle teaching on the (positive) emotions of students. In conclusion, the authors argue that learning cycles are important steps in the process by which wisdom is developed, and that it is, most explicitly, philosophy, and in particular metaphysics, which undertakes the academic and institutionalized effort of cultivating it.

Chapter Nine, "Does Every Student Succeed?: Applying Whitehead's Process Pedagogy and Rhythmic Education to National Standardized Curricula," by A. Suzie Henning, presents a critical analysis of Whitehead's philosophy of education and its manifestation in curricula. It explores the following questions: what is Whitehead's philosophy of education?; what would a curriculum that is based on it look like?; and what might Whitehead's ideas teach educators, teacher educators, and policy makers about nationalized curricula, about high stakes assessment, and about motivating learners? The chapter begins with a consideration of the role of philosophical thinking when it comes to education. There are five "isms" that are accepted as representative of core positions in philosophy of education: perennialism, essentialism, behaviorism, progressivism, and reconstructivism. These are briefly characterized in the chapter. Whitehead's views on education do not belong to any one of these trends. Rather, his thinking about the world is unique and the same is valid for his views about education. Henning argues that Whitehead's philosophy of education has the most commonalities with a progressivist position, but his curriculum, as established in *The Aims of Education*, is most like that of the perennialist. However, Whitehead would argue that perennialism is only half-correct. The whole person learns through the marriage of the liberal with the technical. It is this educational divorce that prevents process philosophers from comfortably aligning themselves too closely with perennialist educators.

If Whitehead is right, educational philosophers have created a false dichotomy between perennialist and progressivist positions. Whitehead offers the contemporary educator a way out of this false dichotomy with a curriculum that merges philosophies, one that views the learner and *praxis* as being at the center of education, but also recognizes theory and tradition as being important. Whitehead contends that education is not an end in itself—it is a means, a process. The Whiteheadian view emphasizes that the process is a coordination of instruction into subordinate cycles that center on the cultivation of mentality, culture, and wisdom. At the heart of Whitehead's curriculum is the promotion of wisdom through an active,

cyclical process. This curriculum is tied to the rhythm of the life span and it is divided into subjects that correspond to the three re-ocurring cycles of romance, precision, and generalization. Education is the constant repetition of these rhythmic cycles and of their "smaller eddies," which correspond to stages of human maturation. Whitehead succeeds where others fail because of his focus and attention on what educators now refer to as "information processing." Whitehead's process curriculum maintains that such a view must also emphasize the development of a self-disciplined, self-developing, cultured intellect. Like the three-phased Rhythm of Education, Whitehead calls for a triadic curriculum that contains three subjects: language, science, and technical education. It is a tricky business, however, to merge these three interests, which are so dramatically different from one another, into one curriculum. How can one curriculum adequately develop liberal arts (language), science (methods and theory), and technical education (action)? The problems that Whitehead identifies in *The Aims of Education* pertaining to the educational practices of his time can be said to also apply to contemporary education. Despite nearly a century of continued introspection on the purpose of education, and on what the best educational practices are, the main problems have still been left unresolved. For this reason, Whitehead's curriculum offers several solutions to modern problems of a national curriculum. The author considers briefly four of them. For Henning, Whitehead's main contribution to education is his argument that any successful curriculum should be unique, individualized, and adaptive. While the curriculum that is laid out in *The Aims of Education* does not provide a full solution, it does challenge educators to reconsider attempts to make curricula "national", "broad," or "assessable." Whitehead's process curriculum offers us a liberal-humanist model that is flexible, pragmatic, student-centred, content focused, demanding of teachers, local, and aimed at the achievement of emancipation and justice. It is a model that is highly critical of the attempts to develop any universal system that can ensure that "every student succeeds."

Chapter Ten, "Narratives of University Education: Whitehead as Master Storyteller," by Howard Woodhouse, considers three main sources of stories from Whitehead's life: his childhood and upbringing; his education and teaching at the universities of Cambridge and London; and the reasons why he valued the professional education of the Harvard Business School so highly. The last one concerns the kind of education that is needed in industrialized societies. The link between these stories is Whitehead's belief in the adventure of ideas that is nurtured by the imagination. Woodhouse begins his investigation with an analysis of why

Whitehead criticizes the effects of scientific materialism upon universities. Whitehead sees the major task for universities as being the education of a professional class that is capable of anticipating the problems of a rapidly changing world. This pedagogical goal cannot be achieved on the assumptions of seventeenth- and eighteenth-century science, because this process requires the freeing of ourselves from materialist abstractions which prevent professionals from recognizing the beauty of both their work and the world. Whitehead traces the origins of the aesthetic sensibility that arose in opposition to the abstractions of scientific materialism back to the romantic poets of the late eighteenth century. The author explains how aesthetic sensibility relates to storytelling in Whitehead's educational philosophy. Whitehead develops an account of education less through clear, logical analysis (of which he is undoubted master) than through a more organic style that rambles through different—sometimes even contradictory—themes that are jumbled up, even turned on their heads as the interrelationships among ideas become less obscure. This poetic, or aesthetic, sensibility, which requires the vivid use of the imagination, is consistent with a belief that the core of university education is also imaginative. The author reveals how the imaginative life, which Whitehead believes is inseparable from that of universities, had its roots in his own upbringing. So, Whitehead's own historical and philosophical understanding was grounded in his experience of the land in the area where he grew up. The stories that he learned from relatives and acquaintances helped him to develop an awareness of the importance of a connection to both culture and the natural world, themes he came to emphasize in his philosophy of organism.

Next, Woodhouse investigates the influence of the period of Whitehead's work at Cambridge on his later views on education. The close pedagogical relationships that he cultivated at Cambridge grew out of ongoing dialogues with others from a wide variety of backgrounds and disciplines. These contributed to his development of a model for the kind of university education that he believed was necessary in order for knowledge to remain fresh and relevant to the young. Nevertheless, in 1910, he left Cambridge for London in the hope of finding a different kind of university education that suited his zeal for reform. London was able to provide a new, vibrant kind of education. One of the reasons for its success was the University's structure, a confederation of colleges devoted to meeting the needs of these different learners, whether in the arts, the sciences, education, business, or later, a women's college. Whitehead was impressed by the collaboration of members of the university with professionals of all kinds, comparing it to both the monasteries of the

middle ages and the universities of the United States. It is little wonder, then, that, as his busy life in London was drawing to a close and his being invited to take up a professorship at Harvard, he would seize the opportunity. This move, which offered him the opportunity to pursue ideas in the history and philosophy of science, the philosophy of organism, education, religion, and social thought, is an example of the adventurous spirit that he advocated in relation to both living and learning. Harvard, like London, was at the forefront of a movement to change university life with a new kind of professional education that was suited to the problems of modern society. Here, Whitehead had realized that the process of learning cannot be reduced to a commodity for sale on the market. Whitehead's hope was for an education of business professionals capable of avoiding the excesses of capitalism. When the Wall Street crash took place just one year after the opening of the Harvard Business School, he took this as further evidence of the need for reform.

Intellectual and cultural power shifted as one epoch in Europe ended and another began in the United States. For Whitehead, the rise of American universities, coupled with the country's growing commercial acumen, would be able to bring about a new civilization founded on the synthesis of imagination and business. However, Woodhouse concludes that unfortunately, Whitehead's vision of universities operating in harmony with business in order to produce the wisdom necessary for an enlightened class of corporate leaders has not been actualized. The pursuit of private monetary profits overrides any other consideration in today's corporate world. And universities move in lock step with the demands of the market, resulting in the privatization of knowledge and the absence of wisdom as a guiding force. Nevertheless, the stories that Whitehead tells along the way are replete with a constructive vision for how universities should change, in order to remain cultural centers whose ideas can be translated into practice in the rapidly changing societies of the future.

Chapter Eleven, "Looking Backwards and Forwards: What Whiteheadians can Learn from the History of Higher Education in the United States," by Marcus P. Ford, provides an overview of the changes in higher education that have developed in the United States over the last three hundred years, doing so from a Whiteheadian point of view. This topic is chosen, because, on the one hand, educational trends in the US have great influence in the world at large, and on the other hand, American universities are pitifully contributing to the systematic destruction of the planet. Thus, a radical reconceptualization of higher education there is necessary. The chapter attempts to give an answer to questions such as: "what should universities be doing?" and "how can universities help us

bring about the kind of future we want for ourselves and for our children?" Ford asserts that there is no one right way to educate everyone for all time, and that to believe so commits what might be called "the Fallacy of the Perfect University."

The history of higher education in America can be told in terms of the history of three other social institutions: the church, the state, and the corporation. Today, corporations and financial institutions rule the world, and universities are in a process of remaking themselves in order to serve this new power. However, it was not so in the past. For example, in the seventeenth century the purpose of higher education was to advance Christian civilization, and in the nineteenth century, two new forms of higher education were invented: one that focused on the "practical arts" and one that focused on "research." Higher education was not simply a means of acquiring technical skills to be used for one's own benefit. Rather, it was also a means to advance the common good, which of course, tacitly means advancing American interests. After the Second World War, most Americans went to public universities in order to study the practical arts, but colleges no longer saw it as their responsibility to see to the moral development of young people. The most recent transformation in higher education in the United States is the transformation from education defined in terms of the national interest to education defined in terms of corporate interests, or at least the financial interests of individuals. The clearest example of the corporate influence on higher education in the United States is the existence of for-profit universities, i.e., universities that are privately owned and operated for the benefit of their investors. In relation to the research university, in theory, it does not work for the church, the state, or the modern corporation, but only for the sake of discovering the "Truth." In actual fact, however, the modern research university in the United States is not really neutral, especially concerning the matters of economic growth and the importance of money. In a word, higher education in the United States is shaped by the dominant power in society. This explains, in general, why American universities are actively engaged in the destruction of the planet.

Next, Ford evaluates the types of universities in the United States, namely, those committed to: (1) Christian civilization, (2) to the state, (3) to research, and (4) to corporations, from the point of view of Whitehead's assertion that the task of a University is to create the future. The author points out that, in theory, the research university, with its commitment to truth, more closely approximates Whitehead's ideal of the university, but regrettably, this is only marginally true. In fact, each discipline is pursuing truth in their own way, with little or no attention being paid to the question

of how all of these various truths might fit together. No thought is given to making sense of reality as a whole, and few are interested in challenging the modern scientific paradigm. It is true that the research university has been extremely productive when measured by its own standards—the creation of new knowledge—and some of this new knowledge is vitally important. Nevertheless, when measured against the goals of rational thought and civilized modes of appreciation—the standard that Whitehead proposed—the research university in the United States is a failure. So, what should be done? The author argues that a university that is committed to creating the best possible future cannot be committed to advancing a particular religion, a particular nation, or to truth for the sake of truth. It also cannot be committed to the endless growth of the human economy. We need to invent a type of higher education that helps us to understand our place in the world, and supports an economy that promotes human happiness and well-being without depleting finite resources. So long as universities are dogmatically committed to the idea that reality is devoid of any value for itself, universities cannot turn their attention to promoting the common good. That is why we need universities that encourage metaphysical reflection. This would need a complete reworking of the curriculum of the universities. The curriculum at every university must take into account both its location and its student population. The fact that universities share a common mission does not mean that they should share a common curriculum. Ford concludes by suggesting that if we are to create a better future or the planet and ourselves, then we will first need to create a different kind of university.

Chapter Twelve, "A Pilot Study on Whitehead's Cyclic Theory of Learning in an Austrian Secondary School," by Josef Kriegseisen, Gerda Hagenauer, and Alexander Strahl, presents an experimental case study that is meant to investigate whether a Whiteheadian, learning cycle approach to teaching science is supported by empirical data. It investigates how scientific reasoning, in correlation with the development of interests in pupils, is influenced in reference to science studies. There are two important tasks in science teaching: first, to avoid the development of inert knowledge, and second, to enhance the interest of pupils in specific themes. The authors investigate the possibility of reaching such goals in using the learning cycle approach. However, there are a variety of learning cycle models.

The authors of this chapter argue for a Whiteheadian approach that consists in the segmentation of the learning process into three major phases: romance, precision, and generalization. Their pilot study was designed in order to test the effectiveness of Whitehead's cyclic learning

theory in secondary education, with regard to the students' cognitive development as well as their interest in science. The hypothesis of the study was that the learning cycle approach would be superior in comparison to the more traditional instruction. The results concerning the impact of the learning cycle approach on the cognitive development of the students as well as on their interest in science show a mixed picture. In general, students in the treatment group do not change cognitively and motivationally in a more positive manner as compared to the control group. However, descriptively, the cognitive development of the learning cycle group is slightly more positive, thereby indicating the expected direction.

An attempt to explain the results is provided. The authors suggest that the duration of the treatment was too short; that the treatment group was been introduced in this new method too late, namely, at the end of their school life; and that the implementation of the learning cycle approach was hampered by the highly structured way that school days in Austrian secondary educational institutions are organized (the current timetable is divided into lessons of fifty minutes in duration). Therefore, the treatment may not have been applied properly so as to accurately gauge the change in student interest over the course of the school year. Another factor that is considered is the fact that the post-measurement was conducted at the end of the school year, while the pre-measurement was conducted at the beginning of the school year. In sum, the exploratory study showed some signs that the learning cycle approach could have positive effects concerning the cognitive development of the students. However, it did not detect any effect for the change of student interest in science at school. It is obvious that there are many challenges when implementing this teaching approach in the context of the regular school system. Further studies will have to be undertaken that account for these challenges.

In Chapter Thirteen, "All We Need, The Earlier the Better: Process Philosophy, Early Childhood Experiences, and Alternatives," John M. Sweeney intends to demonstrate the importance of early childhood experiences and he indicates how process philosophy supports its emphasis. The chapter begins with a classic description of kindergarten experiences. The author argues that certain Whiteheadian notions immediately seem to be applicable. Interpreting pre-kindergarten situations with a Whiteheadian lens would suggest that similar guidelines should apply to, and be part of, learning in pre-kindergarten environments. There are three notions in Whiteheadian philosophy that are to be highlighted: (1) the "power of the past"; (2) "novelty"; and (3) the rhythm of education. The past exercises a powerful influence on the present, as