Complexity Theory and the Politics of Education

Deborah Osberg
University of Exeter, UK

and

Gert Biesta (Eds.)
University of Stirling, UK

Complexity theory has become a major influence in discussions about the theory and practice of education. This book focuses on a question which so far has received relatively little attention in such discussions, which is the question of the politics of complexity. The chapters in this book engage with this question in a range of different ways. Whereas some contributions make a case for the promotion of complexity in education, others focus more explicitly on questions concerning the reduction of complexity in and through education. The chapters do so using theoretical, historical and empirical arguments, paying attention to a range of different educational settings (including early childhood education, school education, post-compulsory education, lifelong learning and work-based education), and focusing on different aspects of these practices (such as curriculum, pedagogy, assessment, architecture, and management). Taken together the chapters not only reveal the potential of complexity for engaging with questions about the politics of education in new and different ways. They also provide examples of a more reflexive engagement with the politics of complexity in education itself.

The book will be of interest to scholars in the fields of education studies, curriculum studies, curriculum theory, educational theory, educational policy, and philosophy of education. It should also be of interest to practitioners in more specialised fields such as early childhood education, school education, post-compulsory education, work-based education and lifelong learning.
Complexity Theory and the Politics of Education
Complexity Theory and the Politics of Education

Edited By
Deborah Osberg
University of Exeter, UK

Gert Biesta
University of Stirling, UK
# TABLE OF CONTENTS

Foreword ............................................................................................................................ vii
Paul Cilliers

1. Complexity, education and politics from the inside-out and the
   outside-in: An introduction ................................................................. 1
   Gert Biesta and Deborah Osberg

2. Five theses on complexity reduction and its politics ......................... 5
   Gert Biesta

3. Increasing complexity by reducing complexity: A Luhmannian approach
to learning ......................................................................................... 15
   Jens Rasmussen

4. The reduction of critique in education: Perspectives from Morin’s
   paradigm of complexity ................................................................. 25
   Michel Alhadeff-Jones

5. Lost children and anxious adults: Responding to complexity in
   Australian education and society ................................................... 39
   Noel Gough

6. Normalising standards in educational complexity: A network analysis .... 57
   Tara Fenwick

7. “Complex global problems, simple lifelong learning solutions.” Discuss .... 69
   Richard Edwards

8. The school and learning apparatus ......................................................... 79
   Maarten Simons and Mark Olssen

9. Assuming equal intelligence in school music and language study:
   What complexity brings to education ................................................. 93
   Ruth I. Gustafson

10. Complexity, consciousness and curriculum ........................................ 107
    Brent Davis, Dennis Sumara and Tammy Iftody

11. After a rhetorics of neutrality: Complexity reduction and cultural
derifference ..................................................................................... 121
    John I’Anson
TABLE OF CONTENTS

12. Thinking complexly: Being-in-relation.......................................................... 135
   Donna Trueitt and William E. Doll Jr.

13. Taking care of the future? The complex responsibility of education & politics .................................................................................... 153
   Deborah Osberg

Notes on Contributors .......................................................................................... 167
“Complexity” has been around in various guises for at least two or three decades. It has generated a certain amount of hype in the nineties, much of which did not really materialise. This does not mean in the least that those using ideas from Complexity are barking up the wrong tree. It means that we are now entering a phase in which we need to evaluate the insights from Complexity critically, and to employ the insights gained to improve our grip on the world. This is no simple task since there is a growing realisation that there is no coherent “complexity theory” which will unlock the secrets of the world in any clear and final way. Instead, we are beginning to understand more about exactly why complex things are so difficult to understand. We really have no choice but to acknowledge that we have to take complexity seriously, even if it does not guarantee perfect solutions. Such an acknowledgement has different dimensions.

In the first place one has to acknowledge that the “discipline” of Complexity is a house divided. There are serious differences between different approaches to complexity, and it has become crucial to reflect critically on these differences. One way of differentiating between them is provided by Edgar Morin (2007) who distinguishes between “general” and “restricted” complexity. Restricted complexity refers mainly to the mathematical and computational approaches to complexity, often strongly informed by chaos theory. This approach, Morin argues, acknowledges the non-linear, relational nature of complex systems, but seeks to tame it in ways which reintroduces positivism and reductionism. General complexity on the other hand, argues for the limits of all approaches to complex systems and urges that we acknowledge these limits and recognise that we need a new language in which to do this, a language which moves beyond Enlightenment ideals of neutrality and objectivity. Whether we can find such a language remains, also for Morin, a contested idea.

The argument is not that restricted complexity is wrong and general complexity correct. The argument is that these approaches are different, and that we have to acknowledge the different values they embody. When we have to solve a specific problem in the real world we cannot involve life, the universe and everything. We have to frame the problem in a specific way and use specific tools and methods. This process restricts the complexity of the problem by necessity, and therefore does not lead to a final, complete and objective understanding of the issues at hand. Our solutions and our understanding remains provisional. We will only take this
provisionality seriously if we constantly return to the critical reflection necessitated
by a “general” understanding of the complex world we live in.

The upshot of this acknowledgement leads us to the second component vital to
a responsible engagement with complexity. If there is no neutral or objective
framework for understanding complexity, it implies that we have to make choices
which cannot be reduced to calculation alone. An acknowledgement of complexity
leads to the acknowledgment of the inevitable role played by values (see Cilliers
2005). The words “value”, “ethics”, “normativity” “power” and “politics” should
feature much stronger in our reflections on complex phenomena than they do
currently.

Acknowledging complexity involves in the first place an acknowledgement of
our limitations. In this regard I propose that, instead of using Morin’s notion of
“general complexity”, we use the notion “critical complexity”. Critical complexity
can employ all the ideas and tools from a wide array of approaches to complexity,
but in a reflexive way. Our methods, tools and models have to be revised continuously,
without the assumption that we will somehow converge on a final solution. There
is hardly a field in which this acknowledgement is more urgent than in education.
To hide the inevitable politics involved in all forms of education behind a pretence
of neutrality and objectivity is an unacceptable form of violence, a violence partly
responsible for the state the world is in.

This book tackles issues of values, power and politics in education head-on. In
doing this, it not only performs a necessary task, but a brave one. One would hope
that it will not only be the community of educators and their students which benefit
from it, but that it will serve as an urgent example to other disciplines as well. If we
wish to find ways of understanding a complex world better, and to find ways in
which to act on this understanding, then an engagement with the “ethics of
complexity” will have to be a priority.

REFERENCES

(Eds.), Worldviews, science and us: Philosophy and complexity (pp. 5–29). Singapore: World Scientific.

Paul Cilliers
Centre for Studies in Complexity
Department of Philosophy
University of Stellenbosch
The essays in this book all deal with a question which, in our view, has so far received insufficient attention in work that aims to explore the significance of complexity theory for education.¹ This is the question of the politics of complexity. Whereas a lot has been written about curriculum, pedagogy and learning, relatively little has been said directly about the ways in which complexity theory might help us to engage with questions concerning the politics of education and about how we might account for the politics of this engagement itself. We take “politics” here in the broad sense of having to do with questions of value and power. For us it is obvious that value and power play a central role in all educational endeavours. In so far as we can see education as having to do with ways of directing, structuring and evaluating human learning—bearing in mind that human learning is not a natural phenomenon but itself has to be understood as a construct—and in so far as we can see education as having to do with ways in which we direct, structure and evaluate the learning of others, questions of value and power are simply inevitable. Education opens up pathways and opportunities but also, and often at the very same time, limits, reduces and even closes down ways of doing and being (see Mollenhauer, 1983). Education, after all, always involves choices. Those who engage in the justification of educational choices often do so using a language of values, whereas those who engage in research on the ways in which education actually opens up and closes down often do so using a language of power. We see these as two sides of the same coin, as we do not think that “opening up” is necessarily good or educationally desirable or that “narrowing down” is necessarily bad or educationally undesirable. What is far more important is to acknowledge that in education both “opening up” and “narrowing down” involve the exertion of power and in this sense can be said to be political.

One discourse surrounding education is that of “control,” and many policy makers and politicians continue to express a desire for making education into a perfectly controllable and perfectly predictable technology. From this angle the fact that many educational practices and processes are not able to achieve a perfect match between
“input” and “output” is seen as a problem that needs to be overcome. Particular conceptions of educational research are often being mobilised with the hope of bringing education closer to the point of alleged perfection. The most recent manifestation of this can be found in discussions around the role of scientifically-generated evidence in educational practice (see Biesta, 2007), while earlier examples can be found in the school effectiveness movement. Complexity theory occupies an interesting position in relation to this, not only because it has questioned the appropriateness of the machine metaphor that appears to inform expectations about control and perfection in education, but even more so because it has questioned the appropriateness of this machine metaphor both for the social and the natural world. In this regard complexity goes beyond binary constructions that see natural and social reality as fundamentally different and that would retain machine thinking for the natural world but would reject it for social reality. However, complexity’s emphasis on nonlinearity, unpredictability and recursivity is not meant as an argument against or a denial of order. It should instead by understood as a case to see order differently, not as something that can be predicted and controlled from preceding conditions but rather as something that emerges in genuinely generative ways.

Many educationalists have found complexity theory helpful for describing, characterising and understanding the dynamics of education differently, not in the least because the language of complexity makes it possible to see the non-linear, unpredictable and generative character of educational processes and practices in a positive light, focusing on the emergence of meaning, knowledge, understanding, the world and the self in and through education. However, utilising complexity in this way is itself a political act as it entails a positive valuation of genuine newness and of that which is beyond our control. It is not enough, therefore, simply to use complexity for stating that educational reality is complex, not in the least because according to complexity theory reality itself can only be understood as emerging. What is needed is a justification—and more specifically an educational justification—as to why complexity, be it as a vocabulary, a metaphor, a theory, a methodology or an ontology, is an educationally desirable “outlook,” “framework,” “point of view,” and the like. To highlight the complexivist character of educational processes and practices and, more specifically, to evaluate the complexivist character of educational processes and practices positively is, in other words, a political intervention which raises the question how this intervention can be articulated and accounted for. This is one aspect of the question of the politics of complexity.

There is, however, a second aspect to this question which has to do with the remarkable fact that despite the complex, recursive, and non-linear character of educational processes and practices, there is a substantial amount of order and regularity in education. Whereas from a non-complexivist perspective this would be taken as the normal state of affairs so that the task would be that of accounting for non-linearity and unpredictability, from a complexivist perspective it is actually the emergence of order and predictability that requires explanation. Complexity theory suggests that order can be achieved—or can become more likely—through the reduction of complexity, for example by limiting the number of possible variables or by reducing the “recursivity” of the system. It thus provides a different outlook on the
question of the creation of educational order. Complexity reduction is, of course, also a political intervention. This indicates that the question of the politics of complexity in education is not only about what we might call the promotion of complexity in education, but also has to do with the reduction of complexity in and through education.

The chapters in this book engage with these aspects of the politics of complexity in a range of different ways. Whereas some of the chapters veer more towards what we have referred to as the promotion of complexity in and through education, others focus more explicitly on questions concerning the politics of complexity reduction in and through education. The chapters do so using theoretical, historical and empirical arguments, paying attention to a range of different educational processes, practices and settings (including early childhood education, school education, post-compulsory education, lifelong learning and work-based education), and focusing on different aspects of these practices (such as questions concerning curriculum, pedagogy, assessment, architecture, and management). More importantly, while some of the chapters work from the inside-out, so to speak, using ideas from complexity theory to engage with political questions, other chapters engage with politics from the outside-in, deploying other theoretical framings and understandings—such as actor-network theory, and the work of Luhmann, Derrida, Deleuze and Foucault—to engage with the themes and issues of this book. Taken together the chapters not only reveal the potential of complexity for engaging with questions concerning the politics of education in new and different ways. They also provide examples of a more reflexive engagement with the politics of complexity in education itself. In this respect the chapters in this book collectively make an important contribution towards putting the question of politics more explicitly on the agenda of work on complexity and education.

NOTES

1 Some authors prefer to speak about “complexity” rather than “complexity theory,” highlighting the fact that “complexity” is not necessarily or not exclusively a theory, but can also be understood as, for example, an ontology or methodology. Interestingly, Thrift (1999) has described complexity as a “new structure of feeling.”

REFERENCES


Gert Biesta
The Stirling Institute of Education
University of Stirling

Deborah Osberg
Graduate School of Education
University of Exeter
Five Theses on Complexity Reduction and its Politics

Gert Biesta

In his monumental study *The mechanization of the world picture* (Dijksterhuis, 1961), Eduard Dijksterhuis has documented how, in the 16th and 17th century, a mechanistic worldview emerged in modern science through developments in astronomy, mechanics, physics, chemistry and natural philosophy. Dijksterhuis marks the start of this process with the publication of Copernicus’ *De Revolutionibus Orbium Coelestium* in 1543 and sees its culmination point in the publication of Newton’s *Philosophiae Naturalis Principia Mathematica* in 1687. In the worldview of modern science physical reality is depicted as a deterministic mechanism operating according to causal laws. Many have taken the success of modern technology as evidence of the truth of the mechanistic worldview of modern science (see, for example, Gellner, 1992 and, for a critical discussion, Latour, 1987), on the assumption that it is the knowledge about the laws that govern the causal connections within the clockwork universe that makes prediction and control of physical reality possible. Some have even gone so far as to argue that the mechanistic worldview of modern science sets the standard for what is real and what is rational (on this way of thinking and the problems it has caused see Dewey, 1980; Biesta, 2009).

Developments in such interrelated fields as complexity theory, dynamic systems theory and chaos theory have challenged both the accuracy and dominance of the mechanistic worldview. They have done this first of all by highlighting phenomena that cannot be captured as deterministic, linear processes, and secondly by developing vocabularies and ways of thinking that are able to make sense of such phenomena and talk about them in more productive ways.¹

From the angle of complexity the mechanistic worldview can be seen as a special case rather than as something that is normal and sets the norm. Whereas deterministic causality may work in closed systems, that is, in systems which do not interact with their environment (or which can be described as not in interaction with their environment), many phenomena in the physical and social world actually operate (or can be described as operating) as open systems, that is as systems that are in interaction with their environment and depend on such interaction for their existence. Complexity is interested in the ways in which open systems achieve
their integrity and maintain it over time, a process which is understood in terms of the idea of self-organisation. The idea of self-organisation introduces an important distinction between complexivist and mechanistic approaches to understanding continuity and change as from a complexivist perspective a particular state of a system is not thought to be deterministically caused by a previous state. This phenomenon is generally discussed with reference to the notion of “emergence.” Emergence refers to the fact that “as systems acquire increasingly higher degrees of organisational complexity they begin to exhibit novel properties that in some sense transcend the properties of their constituent parts, and behave in ways that cannot be predicted on the basis of the laws governing simpler systems” (Kim, 1999, p. 3). Within the discussion on emergence it is important to make a distinction between a “weak” and a “strong” conception of emergence (see Osberg & Biesta, 2007). In the weak sense, emergent properties are understood as novel in that they are unexpected given the principles governing an earlier state. However, such properties can emerge entirely deterministically from non-linear rules of interaction, as is the case with fractals. Although the fractals in themselves are surprising, their emergence is nevertheless completely explainable in terms of the earlier state of the system. In the strong sense, however, emergent properties can be understood as novel in that they are not deducible even in principle “from the most complete and exhaustive knowledge of their emergence bases” (Kim, 1999, p. 6).

The vocabulary of complexity has proven to be generative for understanding a wide range of processes and practices in a radically different way. What is particularly important is the ability to understand the open, recursive, organic, non-linear and emergent dimensions of physical and social processes as positive and necessary aspects of complex systems, rather than as deviations from the norm or as epiphenomena that need to be explained away. This is also the case in the field of education where complexity has provided a language for articulating the fact that educational processes and practices tend to be characterised by nonlinearity and unpredictability and by a fundamental gap between “input” (teaching, curriculum, pedagogy) and “output” (learning) (see Biesta, 2004; in press[a]; Vanderstraeten & Biesta, 2006). Moreover, the idea of emergence not only makes it possible to highlight that knowledge, understanding and reality are themselves emerging through educational processes rather than that they are simply represented in and through education (see Biesta & Osberg, 2007; Osberg & Biesta, 2008). Complexity also makes it possible to highlight the fact that individuals emerge in and through educational processes in unique and unpredictable ways. To the extent that education is not only about qualification (the transmission of knowledge and skills) and socialisation (the insertion of individuals into existing social, cultural and political orders), but is also characterised by a concern for the “coming into presence” of unique, individual beings (see Biesta, 2006a; 2010), complexity therefore also provides a useful vocabulary for understanding education in what might be called an educational way.

Complexity, however, cannot only help to understand the complex—or perhaps we should say: complexivist—character of the physical and social world. At the very same time it provides a different perspective on what is or appears to be not complex.
FIVE THESES ON COMPLEXITY REDUCTION

Complexity allows us to see order, stability, structure and "simplicity"—if this might count as the opposite of "complexity"—as the exception and deviation from what is considered to be the normal course of affairs. The important question complexity thus helps us to ask is how in a complex "universe" it is possible to achieve a reduction of complexity. Particularly with regard to social reality it also helps us to ask who is actually reducing complexity for whom and whose interests are at stake or being served by doing so. To the latter issue we may refer as the question of the politics of complexity reduction. In this chapter I offer some reflections on complexity reduction and its politics in the domain of education.

THESIS 1—Complexity cannot only help us to understand the complex character of the physical and social world. At the very same time it provides us with a different understanding of those aspects of the physical and social world that are or appear to be not complex. The question it thus helps to ask is how reduction of complexity is achieved. Particularly (but not exclusively) with regard to the social world complexity helps us to ask who is reducing complexity for whom and in whose interest. This is the question of the politics of complexity reduction.

In general terms complexity reduction has to do with reducing the number of available options-for-action for "elements" within a system. Fast food restaurants are a good example of a system with reduced complexity, as the number of available options for action—both for customers and for staff—are significantly reduced so as to make a quick and smooth operation of the system possible. Protocols used by call-centre workers are another example of complexity reduction, although in such cases the gain is often not to be achieved in the speed of the process but in its comprehensiveness, making sure that all aspects are covered in a way that is convenient from the perspective of the call-centre worker, not necessarily the customer.

Complexity reduction not only happens in commercial organisations. Education, particularly in the form of organised schooling, is another prominent example of a system operating under conditions of complexity reduction. If it is granted that human learning is a ubiquitous phenomenon—which means that it happens or can happen everywhere and all the time (but see below)—then schooling can be seen as a very specific way to "channel" or "tame" human learning through a range of differing measures. Schooling as a social institution can in itself already be understood as a way to reduce the complexity of human learning by giving it a particular social location. School buildings reduce the complexity of human learning by isolating it from everyday life and giving it a material location. The school year, time tables and curricula put learning within temporal boundaries. Further reduction of complexity takes place through such measures as putting students of similar age, ability or achievement together, exposing them to the same content through the use of staged curricula and, perhaps most importantly, by introducing regimes of assessment and examination through which, from the vast number of possible outcomes of schooling only those are selected that are considered to be valuable (see below). All this works to reduce the complexity of human learning and bring this learning under control.
The reduction of complexity is not only achieved in space and time, but also operates discursively. One could even argue that it is not enough just to put children and young people together in buildings since the reduction of the complexity of human learning only becomes schooling if the activities and practices are named and interpreted in this particular way, that is, as schooling. This suggests that complexity reduction of open systems such as human learning not only works through a reduction of options-for-action within the system but also through impacting upon the “recursivity” of the system, that is, the way in which elements of the system feed back into the system—in this case through the ways in which activities are named and interpreted. Although the “materiality” of schooling is perhaps the most visible aspect of how schooling reduces the complexity of human learning—putting students in buildings and through curricula—the discursive construction of schooling is perhaps even more important for this reduction of complexity. A phenomenon such as work-based education does, after all, not depend on a particular physical location in order to become a practice of schooling, but becomes a form of schooling because of its identification as “education” rather than “work.”

Along these lines complex open systems generally come to resemble less open systems, that is, systems where there are fewer possible connections between inputs and outputs, between actions and consequences and where, as a result, regularity and structure begin to emerge. Seeing how this is brought about begins to make visible the kind of work—and also the amount of work—that needs to be done in order to create the kind of order in which things can begin to work and in which connections between actions and consequences begin to become more predictable and more secure. Rather than to think of such regularities as naturally occurring phenomena, they are actually in the most literal sense social constructions. Since any attempt to reduce the number of available options for action for the “elements” within a system, complexity reduction is about the exertion of power and should therefore be understood as a political act.

One important question to ask in relation to this is who actually benefits from the reduction of the complexity of human learning. It is important, in this context, to emphasise that reduction of complexity is, in itself, neither good nor bad. We cannot say in any abstract sense whether it is more desirable to have a particular system operating closer to equilibrium—that is, closer to a situation that is akin to a closed system—or further away from equilibrium. This all depends on what one wishes to achieve or hopes will occur. Who, then, might benefit from the reduction of the complexity of human learning? It is tempting to focus particularly on “society” since both governments and the economy may well benefit from situations in which the complexity of education is reduced, for example, in order for formal education to turn individuals into “obedient citizens” or a skilled workforce. More generally one can write at least part of the history of formal education from the perspective of social order, that is, as seeing the school as an instrument to keep children off the streets and make them ready for an orderly life in an orderly society. But individuals can benefit from the reduction of the complexity of human learning too, first of all because it can provide them with
more structured and less open pathways of learning—which is particularly important if such pathways provides access to jobs or positions in society—and also because a situation which is all too open may actually hinder rather than promote certain forms of learning. It all depends, therefore, on what one hopes to gain from participation in formal schooling.

**THESIS 2**—Formal education (which includes schooling and educational practices and activities in non-formal settings) can be seen as an example of the reduction of the complexity of human learning. Complexity reduction in education is, in itself, neither good nor bad. Both societies and individuals can benefit from complexity reduction, although it can also hinder learning.

Perhaps the most important way in which complexity is reduced within formal education is through assessment. Assessment is, after all, the practice through which it is decided which aspects or dimensions—or “outcomes,” if one wishes to use this word—of learning count. This, however, raises an important theoretical issue, which is whether we should understand complexity reduction as a prospective or a retrospective process, that is, whether we should understand it as a process that works upon the future or upon the past. We could say, after all, that assessment happens after the event of learning, as it is only through assessment that particular learning becomes valid and validated. Although assessment thus reduces the number of options-for-action within a system, it does so retrospectively, which is the reason why I suggest to refer to this as an example of **retrospective complexity reduction**.

However, because educational systems are recursive systems, that is, systems in which the ways in which the “elements” interpret the situation they are in impacts upon their actions and thus upon the overall direction of the system as a whole, the anticipation of assessment will not be without effect. After all, the fact that the “elements” within the system—students and teachers—are generally aware that at some point achievements will be selected and assessed, will most likely influence the actions within the system and thus will contribute to direction in which the system will evolve. The anticipation of assessment can therefore also contribute to the reduction of the complexity of the system because of the fact that the “elements” within the system will themselves already select certain actions and not others in anticipation of the intervention of assessment later on. Assessment thus provides us with an example of complexity reduction in education which operates both retrospectively and prospectively—an option that appears to be specific for open recursive systems. Who benefits from these forms of complexity reduction remains, as before, an open question.

**THESIS 3**—Complexity reduction in education not only happens prospectively (through the reduction of initial variables) but also retrospectively (through backwards selection of particular trajectories). One of the most explicit examples of retrospective complexity reduction in education is assessment, because assessment validates some learning trajectories and invalidates others, but always does so “after the event.” Because education is a recursive system, the anticipation of assessment also reduces complexity. In this way assessment also functions prospectively in the reduction of complexity. The question who
might or will benefit from these forms of complexity reduction is, again, an open question.

Retrospective complexity reduction not only occurs in the relationship between assessment and learning, that is, in those cases in which assessment identifies and selects certain “outcomes” of learning as valid. Following this line of thinking it can also be argued that to identify something as learning is itself already a form of retrospective complexity reduction. If we start from a rather open definition of learning as “any change that is not the result of maturation” or, in a slightly more precise version, as “any more or less durable change that is not the result of maturation,” we can begin to see that when we use the word learning—such as in sentences like “Mary has learned how to ride a bicycle” or “Mary has learned the first law of thermodynamics”—we are not so much describing something as that we are making a judgement about changes that have taken place. The point here is that when we look at Mary more carefully we will probably be able to find numerous changes going on all the time. The reason for identifying some of the changes as “learning” and others just as “changes” is because we value these changes and because we have reason to believe that these changes are the result of engagement with the environment, not just effects of maturation—which is not to suggest, of course, that this distinction is easy to make and that the difference is always clear-cut. This implies, however, that using the word “learning” always implies a value judgement. “Learning,” in other words, is not a descriptive term—it is not a noun—but it is an evaluative term which operates as a selector vis-à-vis a possibly infinite number of options to select from.

The upshot of this is that we can only use the word “learning” retrospectively, that is, after some change has happened. This means, however, that whether any current activity will actually result in learning—that is, whether any current activity will or will not result in more or less durable change that is considered to be valuable—is not something we can know when we are engaged in the very activity. Whether you will learn anything from reading the words on this page is, in other words, a question that can only be answered in the future—and sometimes it can take a very long time before we conclude that we have learned something from a particular experience or event—which is an important argument against short-term thinking in education. This implies that the word “learning” does not refer to an activity. Just as “learning” is not a noun it is, therefore, also not a verb. If we wish to be clear and precise in the language we use to talk about and “in” education, we shouldn’t, therefore, refer to the activities of our students as “learning” but should rather use such words and phrases as “studying,” “making an effort,” “working,” and so on. For the same reason we should resist to refer to our students as learners but should either refer to them with terms that specify the particular relationship they are engaged in—which could be a reason for referring to them as pupils—or with terms that indicate the particular activities they are engaged in—which is what a word like “student” can do, but also a word such as “worker” (which is the name the Dutch progressive educator Kees Boeke used for referring to the students in his school to which he referred as a “workplace”) (see also Biesta, in press[b]).
To deploy the word “learning” is therefore another example of retrospective complexity reduction—one that, just as the word “assessment,” is also likely to reduce complexity in a prospective manner in recursive open systems such as education. After all, to simply say that a particular activity has learning as its purpose will already impact on the actions of the “elements” within a recursive system. What is crucial in this respect is the question who is in a position to make judgements about change; what is crucial, in other words, is the question as to who has the right or power to define what counts as learning (see also Biesta, 2006b).

**THESIS 4—“Learning” is neither a noun nor a verb. To use the word “learning” rather means that one makes a value judgement about change and identifies some changes as valuable. Such judgements can only be made retrospectively, which means that using the word “learning” is itself a form of retrospective complexity reduction. To “frame” an activity as aimed at generating learning can, however, also contribute to the reduction of the complexity so that, in this way, the use of the word learning can also be taken as an example of prospective complexity reduction. The critical question in this is who has the “right” or “power” to identify or define what counts as learning.**

One question this raises is whether the idea of retrospective complexity reduction makes sense from a complexivist perspective. The reason for asking this question has to do with the particular way in which change is understood in complexity—an issue which brings us back to the distinction between a “weak” and “strong” understanding of the idea of emergence. Whereas in a mechanistic universe all processes are in principle reversible—after all, nothing really new emerges in such a universe, it is just a rearrangement of already existing elements—complexity depicts a universe in which the later state of a system is genuinely new. Prigogine has explored this in his “theory of irreversible processes” (Prigogine & Stengers, 1984, p. 310). The central idea of this theory is that in open systems, unlike in closed systems, the trajectory of the system is not deterministic but probabilistic (for more detail see Osberg & Biesta, 2007, pp. 34–40). In the state of non-equilibrium that is characteristic of open systems, systems can “jump” to a new form or level of order. The point of Prigogine’s theory is that such jumps are radically underdetermined by preceding conditions. When a system responds to an external flux by jumping to a new form or level of order, there are therefore always a number of structural possibilities that are equally satisfactory in terms of the known physical laws. Prigogine calls the point at which these possibilities appear a bifurcation point. At a bifurcation point the system must choose between several equally satisfactory options and the point of Prigogine’s line of thinking here is that this is a real choice, not one that is in any way determined by the system and its properties. As Prigogine puts it: “The system “chooses” one of the possible branches available when far from equilibrium. But nothing in the macroscopic equations justifies the preferences for any one solution.” (Prigogine, 1997, p. 5)

It may appear that from this point of view the idea of retrospective complexity reduction makes no sense because of the fact that the “jumps” that open systems make are fundamentally irreversible. Because something genuinely new comes into
existence there is no way in which the system can simply go back to its earlier state. It seems, therefore, that in a complexivist universe time runs strictly in one direction so that the idea that complexity could be reduced retrospectively simply makes no sense. What is important here, however, is the relationship between the choices that are “made” or achieved at bifurcation points and the trajectories that lead up to those choices. Prigogine characterises such choices as probabilistic in order to highlight that the particular trajectory that emerges is in no way determined by previous conditions. Nonetheless, as soon as a particular choice has been made, we could say that the trajectory that led up to that choice now has become the trajectory of that choice. In this respect we might say that the choice that occurs at a bifurcation point operates as a selection and, in this particular sense, seems to operate on and, in a sense, even seems to alter the past. The idea that the particular selection emerging in the present in a sense impacts on the past has been articulated quite eloquently by George Herbert Mead in his Philosophy of the present (Mead, 1932). In it Mead suggests that the past “must always be set over against a present in which the emergent appears, and the past, which must then be looked at from the standpoint of the emergent becomes a different past” (Mead, 1932, p. 2). Put in this way, the idea of retrospective complexity reduction actually fits with the complexivist idea of irreversible processes, rather than that it appears as an anomaly within such a view.

**THESIS 5**—The idea of retrospective complexity reduction appears to be at odds with key insights from complexity, particularly when we understand complexity as a theory of strong emergence or, in the words of Prigogine, a theory of irreversible processes. If, however, we take Prigogine’s ideas seriously that the “choices” that are made at bifurcation points in the trajectories of non-equilibrium systems are not deterministic but only probabilistic, we could argue that the “outcome” that is “chosen” changes the “identity” of the trajectory that led up to the choice. In this way the idea of retrospective complexity reduction might actually be central to a complexivist understanding of complexity reduction.

**ACKNOWLEDGEMENT**

I would like to thank Deborah Osberg for stimulating discussions about complexity and education. My discussions with Raf Vanderstraeten have been crucial in developing my ideas about complexity reduction.

**NOTES**

1. I deliberately formulate this difference in methodological rather than ontological terms. The main reason for this is that complexity and related approaches have important implications for what it means to “do” ontology—and, for that matter, also for what it means to “do” epistemology (see Osberg, Biesta & Cilliers, 2008). It is therefore too simple to suggest that complexity just offers us a new ontology or world view.

2. Whether attempts to reduce complexity at the very same time “add” complexity to a system is a question which I will not be able to discuss within the confines of this chapter. I refer the reader to the contribution by Rasmussen in this volume.
FIVE THESES ON COMPLEXITY REDUCTION

REFERENCES


Biesta, G. J. J. (in press[a]). Deconstructive pragmatism as a philosophy for education. Educational Philosophy and Theory.

Biesta, G. J. J. (in press[b]). Learner, student, speaker: Why it matters how we call those we teach. Educational Philosophy and Theory.


Mead, G. H. (1932). The philosophy of the present. La Salle, IL: Open Court.


Gert Biesta
The Stirling Institute of Education
University of Stirling