# Introduction

In his book *The Mighty Micro. The Impact of the Computer Revolution* (1979) Evans writes

> we have to admit that thousands of years of academic effort all add up to very little understanding of what the teacher is doing when he teaches and how the pupil is learning what he is being taught.
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> *(Evans, 1979, p. 116)*

Yet Evans goes on to claim that we think education is something simple, something we can easily accomplish if we only find the right formula in science or in technology, or a combination of both. So seductive is this idea of simplicity that Evans himself, in spite of his scepticism, goes on to claim that computers provide a solution to the age-old enigma of education. And he is not alone. Technologies like films, radio, television, Skinner boxes, and computers have all been hailed as the solution to all sorts of educational problems. Backed by the latest in science, the new technology will inspire and motivate pupils, adapt to their individual interests and abilities, give them access to the latest in knowledge, replace teachers, and reform classrooms or even make them obsolete. Schooling will be fun, easy, and successful.

Since the late 1970s these claims and high hopes have been touted for computers and the Internet. The scientific support has primarily come from the ideas of Noam Chomsky and Jean Piaget. Although these thinkers are different in many respects, their shared idea that children, and especially infants, learn language or other things easily and mainly by their own efforts has lent support to computers as ideal learning tools. Computers make learning fun and easy, and require a minimum of intervention from teachers and other

adults. This assumption goes hand in hand with a socio-economic rationale. Computer-based education requires less investment and input from parents and teachers. In dual-income families the computer helps with homework when parents do not have the time. Teacher competence seems less in demand, and teachers need only be coaches. Needing fewer teachers and less classroom space is also attractive to school administrators. However, it has become increasingly evident (e.g., Cuban, 2001) that computers have, like all prior technologies, failed to improve schooling radically.

Is it a failure of computers, of their use, or of the science that provides the rationale for their use? I argue that the theories of cognition, cognitive development, and learning informing the use of computers in schools, especially the theories of Jean Piaget, are flawed and partly responsible for the view that computers can and do enhance learning. The problem is thus not so much with the technology itself as with how learning is conceptualised relative to it.

Children and infants are not small proto-scientists testing theories or hypotheses on their own, but social creatures being introduced into social and cultural contexts and norms. The idea of a lone and smiling infant in front of a computer, doing things even his or her parents cannot do, is mistaken. It is mistaken not because infants are unsuccessful learners. Early learning, especially learning one's mother language, is perhaps the most successful learning we know of. But learning one's first language is not primarily a natural process – something one's biological endowment takes care of. It is most importantly a social accomplishment involving not only the infant exercising his or her biological abilities, but other people, a discursive context, and specific, historically situated cultural practices.

Human beings are cultural beings. They become human and acquire human abilities and knowledge not solely as a result of their biological endowment, but as a result of being treated in a special way by other humans. Since prehistoric times humans have changed and cultivated their physical environment – plants, animals, and objects – but also, perhaps most significantly, themselves. Culture is everything

which has been changed or modified by humans, and this is especially true of other human beings. To be exiled from one's group is perhaps the most severe punishment that one can suffer. Indeed, being able to participate in social interactions is a precondition for learning other things. This is evident with autistic children, whose inability to engage normally with other humans make them severely handicapped linguistically and cognitively (Greenspan and Shanker, 2004). Greenspan and Shanker, among others, give compelling evidence that the crucial aspect of symbol formation, language, and thinking is not genetic preprogramming (Chomsky) or physical sensori-motor activities (Piaget), but a learned cultural ability. This learning depends on specific types of nurturing and social interactions and other cultural practices. These are passed down and thereby learned by each new generation, dating back to pre-human cultures. It is this crucial aspect of early learning that Piaget, Chomsky, and mainstream psychology have overlooked. The focus on biological aspects has led to simplified models of education. Infant acquisition of symbols, language, and thinking is a paradigm for other learning because of its social nature, not because of its biological dimensions. It is this intense social interaction which makes this learning motivating, enjoyable, and successful. This is the lesson for all learning situations and especially schooling.

There is still much more to learn about how teachers teach and pupils learn – and about what happens in the workshops I call schools. But a good point from which to start our quest is to recognise that it is a joint venture, in which human biology is an enabling condition, but nothing more. Varying and changing social and cultural practices and traditions are the core of learning, and any attempt to escape from this fact, and all the variation and complexity that follows from it, is bound to be futile. Paving the way for a social and discursive approach to learning is my aim.

# 1 The infantilisation of learning

## INTRODUCTION: THE PROBLEM SITUATION

### *Computers and learning*

During the last twenty to thirty years, schools have put a monumental amount of money and effort into introducing computer technology.[1] There have been many reasons put forward to justify this, including saving money in the long run, providing education to groups outside traditional schools or to remote regions, preparing pupils for new working conditions, and so on. But one of the main motivations has been the claim that the technology improves the conditions for learning by making education more flexible in its adjustment to the individual, more like real life, more fun, and thus more motivating. It promotes the pupil's own engagement and active involvement in his or her own education. Underlying such beliefs is, I argue, a view that pedagogical thinking has appropriated from developmental cognitive psychology, namely the idea that all learning is like early infant learning, that is, all learning is grounded in biological abilities and is to a large extent innate, automatic, and unconscious. The task of the school is to mimic the conditions of this early learning situation so that learning in schools will improve. Computer technology is not just one resource that is believed capable of doing this, but also one that will succeed where others have failed.

The computer, e-mail, Internet, multimedia, games, and virtual reality technologies are all seen to be bridging the gap between schools and real life (see for example Papert, 1980/1983, 1993; Schank and Cleary, 1995). Furthermore, these technologies are taken to be intrinsically motivating and therefore argued to be recreating the ideal

[1] See for example Armstrong and Casement (1998, ch. 1) and the journals listed in the appendix to this book.

situation for learning. And the ideal situation for learning is the one that infants are in: they learn quickly, without explicit instruction, and seem highly motivated. Thus, the theories minimise or even deny the differences between different cognitive skills, as well as the differences in social situation and also the different 'subject matter' of schools and everyday learning – where one is 'natural' and the other is abstract, symbolic, and conventional. Such thinking conceptualises all learning as natural learning in the sense that all learning is based on the individual learners' biological or natural abilities, as contrasted to learning which requires cultural and social interactions of specific kinds. This biological approach has grown stronger in recent years, particularly in the evolutionary approach to cognition and cognitive development (e.g., Bloom, 2004; Buss, 1999, 2005; Hauser, 2000; Hurford, 2007; Pinker, 1984, 1997, 2002, 2007).

Although the idea that school learning in important respects is similar to infant learning is especially prevalent in the literature on computer use in education (see Chapter 2 for a more detailed discussion), it is, I argue, an idea that is more widespread than this. For example, it is found in views which claim that it is essential that learning is fun and enjoyable and that the child is the best judge of both this and what he or she wants to learn. There are increased expectations of immediate satisfaction of subjective needs, and the classroom is turned into a place where an enjoyable experience is more important than learning something new.

The conception of learning underlying this approach to education and educational technology is the topic of this book. I will not discuss, except in passing, the actual use, reception, or effectiveness of computers, including the Internet, but will focus instead on the underlying assumptions about learning, knowledge, and the mind that are utilised in arguments put forth in support of the educational value of computers. The assumptions are to a large extent appropriated uncritically from developmental psychology, and especially from the constructivist approach of Jean Piaget. In particular, I shall focus on his theories in my critical evaluation of what I call the infantilisation of

education. Today much of developmental psychology is part of the growing trend towards explaining all psychological traits and behaviours in evolutionary terms. But the evolutionary approach has been part of developmental psychology from the beginning (see Morss, 1990). In Chapter 5 I discuss today's evolutionary psychology, arguing that it is problematic and that Piaget actually recognised and tried (but failed) to solve one crucial challenge to this approach, namely the human being's ability to go beyond the information given.

**The infantilisation of learning**

Growing up human is a process by which a natural infant is turned into a domesticated creature, a human adult. Important parts of this process include linguistic and cognitive, as well as social, moral, and emotional, development. Much of this process also depends on the infant's natural abilities, some of which he or she shares with many other animals, but it is also crucially dependent on the child's being part of a culture, being engaged in social interactions, and being treated as a human being by others.

When the newly born human infant confronts the environment for the first time, it is a helpless creature that is totally dependent on others to satisfy its needs, orient itself in the environment, and avoid dangers in its surroundings. Although human infants share many abilities with other animals, in many respects the human infant is more helpless than most other newly born creatures. Yet, under normal circumstances,within a few years the infant has acquired its native language, a remarkable ability to deal with its environment, and a complex set of beliefs about both the physical and social world and other people. Unlike its closest relatives among the animals – the primates – humans are biologically adapted for cultural learning (see for example Tomasello, 1999, 2000, 2008; Wexler, 2006).

The helpless infant is transformed into a talking, thinking being, actively involved in and contributing in a modest way to its culture and intellectual heritage, first in the smaller family setting, among its peers, and later in school or similar contexts. This acquisition is a very

impressive achievement, which most children – under normal circumstances – accomplish with ease. It is, however, an ease that seems to be more difficult for pupils to recapture in later learning situations, especially in formal schools.

For a long time philosophers, educators, and others interested in learning and the growth of knowledge neglected early infant learning. Although scholars like John Locke and Jean-Jacques Rousseau were interested in children, this very early development and learning in infants were not seen as interesting or important. In contrast, the last hundred and fifty years have seen a growing interest in this early cognitive development and learning. The evolutionary biologist Charles Darwin's study of the language acquisition of his own infant son (Darwin, 1877/1974), signalled this change, and increasingly over time infant development has become the central focus of developmental psychology.[2] Although many psychologists have contributed to this (e.g., Stanley Hall, James Baldwin, Sigmund Freud, Lev Vygotsky), Jean Piaget and his studies of infants have been crucial (see for example *The Origins of Intelligence in Children*, 1936/1963). But Freud's focus on the first five years as determining much of later behaviour and personality has perhaps been even more important. Furthermore, Noam Chomsky's theories of innate language capacity and universal grammar have since the late 1950s influenced a growing literature on early infant learning of language.[3] Particularly as a result of Chomsky's writings, the problem of infant learning has also, and perhaps rather surprisingly, become a problem in philosophy. A good illustration of this is Jerry Fodor's generalisations of Chomsky's ideas (Fodor, 1975/1979). Fodor's conception of an innate language of thought as a prerequisite of all learning, especially early conceptual learning, focuses on the predicament of the infant as a learner.

[2] Most subsequent theories of developmental psychology have been influenced by evolutionary views and had a strong biological bias, although much of it has been influenced more by pre-Darwinian than Darwinian ideas (see for example Morss, 1990).

[3] See for example Chomsky (1968, 1975); Pinker (1984, 1997, 2007); and Wanner and Gleitman (1982).

Instead of being at best a marginal case of learning, infant learning and cognitive development has come to take centre stage and has become the paradigmatic case of learning (see especially Gopnik, 2009). The idea that later learning – indeed all learning, including that of the scientist – in crucial aspects is the same as infant learning has moved even more to the forefront recently. A version of this idea is found in the work of Gopnik and Meltzoff (1997). They claim that the cognitive development of children and the growth of scientific thinking are the same: the infant is a scientist in the crib (Gopnik, Meltzoff, and Kuhl, 1999).

In pedagogy the same shift in focus can be seen, with infant learning in this context increasingly taken to be the paradigmatic case of learning. This focus on the infant is part of what is usually called the child-centred approach to schooling because it not only focuses on the child, but also makes the more specific claim that ideally all learning in school should be like infant learning.[4] An example of the use of this model of learning is, as noted, found in discussions of the use of computers as learning tools (see for example Papert, 1980/1993, and the discussion in Chapter 2), but is found in other contexts as well (Wells, 1999). For example, Seymour Papert (1980/1993) thinks that all learning can be assimilated into one kind of learning, namely the one that the infant engages in. He argues that the situation of learning one's first and native language can be reproduced with the help of computers. Children learning a simple program language like LOGO learn maths or other abstract subjects in the same way as a child learns its first language (for a more detailed discussion, see Chapter 2). As I show in Chapter 2, many discussions of computers as educational tools utilise ideas similar to Papert's, and argue that computers support a learning situation like the infant's and thus enhance this kind of 'natural learning'.[5] Here the central focus is, as noted, the assumptions about cognition and its development that underlie and inform such

[4] However, all child-centred pedagogues do not make this claim.

[5] This ideal of learning underlies many aspect of current pedagogical thinking, stressing the importance of enjoyable learning situations, where the child sets his or her own

theories of learning. Other aspects of development, though connected with and inseparable from belief change, will not be discussed.

This interest in infant cognitive development and learning in education is especially remarkable since educators traditionally have pointed to the difference between learning in schools and learning in natural settings like the family. In *Democracy and Education* (1916/1966, p. 6; see also 1990) John Dewey stresses that there is a difference between the education everybody gets from living with others, and the deliberate education of the young. In the latter type of education the learning of facts and values set up by society is the primary reason for interaction and there is, unlike in other types of learning, little or no learning by sharing activities in immediate and natural settings. Instead, what is learned is stored in symbols, which are often remote from everyday action and personal relationships. It is an artificial, conventional context, which is foreign to everyday life. Emile Durkheim (1922/1956) likewise emphasises that although the unconscious education we get from living with others in society never ceases, it is different from the formal and deliberate schooling of children, which systematically turns them into social beings, in the sense of conforming to the more explicit standards and norms of society. David Hamlyn (1978) also distinguishes between early and later learning, of which the latter typically takes place in schools, stressing that close personal relationships are not the conditions for later learning and that such learning makes use of concepts already acquired. Jerome Bruner (1971) argues that in formal education or schooling, learning occurs outside the context of immediate action and depends on the ability to follow the abstraction of written texts or oral speech. In school, learning is an act in itself, freed from the immediate ends of particular actions, in which the telling and demonstrations involved to help the learner acquire knowledge are taken out of their normal contexts. David Olson (1994), whose primary interest is in the acquisition of reading and writing, likewise stresses the symbolic, conventional, and

goals of learning and also gets immediate satisfaction. The term is used most explicitly by Schank and Cleary (1995), which I discuss in Chapter 2.

out-of-context conditions such skills build upon. The alphabetical script, like other scripts, is a conventional system of notation, and the written text lacks many clues that are present in oral linguistic interactions. For example, the illocutionary force of an utterance – that is, how it should be taken or understood – is less marked in written than in oral face-to-face discourse. Olson (2003) also argues that the school is a bureaucratic institution and as such affords very different conditions for learning from those of more informal settings, like the family. Howard Gardner (1983) distinguishes between education in so-called non-literate societies lacking formal schooling or the equivalent, and that in societies with formal schooling. He stresses the ways in which formal schooling makes use of and develops the different intellectual potentials of individuals. Although these scholars do not present systematic accounts of the difference between the mechanisms involved in the different learning contexts, they all explicitly recognise it.

Many developmental psychologists also make a distinction between early and later cognitive development and learning. Piaget's stage theory of cognitive development – the sensori-motor stage from birth to around two years of age, the stage of concrete operations until six or seven years of age, and then the stage of concrete operations up to the final stage of formal operations around thirteen years of age – is an example of this. Yet Piaget's stress on assimilation and accommodation as the functional processes involved in all cognitive change has, as we will see in Chapters 3 and 4, lent support to the view that all learning is fundamentally like infant learning. Vygotsky's (1934/1994, 1978) distinction between elementary and higher mental or psychological functions as a result of acquiring language is another well-known example of a distinction between very early cognitive development and later development. He argues that later, or higher, cognitive development is qualitatively different from earlier, elementary forms: 'Unlike the lower forms, which are characterised by immediacy of intellectual processes, this new activity is mediated by signs' (Vygotsky, 1934/1994, p. 109).