

LEARNING SCIENCES AND BRAIN RESEARCH:

POTENTIAL IMPLICATIONS FOR EDUCATION POLICIES AND PRACTICES

Project Description

Introduction

The project on "Learning Sciences and Brain Research" was introduced to the OECD's CERI Governing Board on 23 November 1999, outlining proposed work for the future (see below). The purpose of this novel project was to create collaboration between learning sciences and brain research on the one hand and researchers and policy-makers on the other hand. The CERI Governing Board recognised this as a risk venture, as most innovative programmes are, but with a high potential pay-off. The CERI Secretariat and Governing Board particularly agreed that the project had excellent potential for better understanding learning processes over the lifecycle, but that ethical questions also existed. Together these potentials and concerns highlighted the need for dialogue between the different stakeholders.

1. Findings

1.1. Learning and social change

Economic and social developments in OECD countries necessitate an ever-increasing effort and investment, both personal and institutional, in education in the broad sense. Not only must individuals acquire initial training as advanced as possible in order to enhance their performance and increase their chances of entering the labour market but, once they have entered the market, they must embark upon a process of lifelong learning in order to preserve their relative position in a fiercely competitive environment. Moreover, the development of the “information society” or “knowledge society” increases the need for individual learning, which is becoming more and more of a lifelong process.

1.2. Innovation as a necessity

Although not entirely new, innovation is becoming a necessity as the 21st century dawns. It represents a major challenge for educational institutions and policies in all 30 member countries, as well as a new area for research. Nearly all previous educational models need to be revised, as they are being rendered obsolete by changes in the environment. Ongoing innovation can thus be considered from two angles. As a process of continuous adjustment to change, and more importantly, as a process that foreshadows the future.

1.3. Key to this initiative

The only element that can be considered “stable” in a perpetually shifting environment driven by change, evolution and revolution, is the foundation for the whole learning process - the human brain. A neuroscientific approach to learning has yet to be developed. As this is a vast uncharted territory, our goal is to see if there is relevant research that can better guide education policy makers as to how the learning sciences and brain research can begin to find common objectives.

2. Neuroscience and learning science: The state of the art

2.1. Shortcomings

Most commentators agree that policy making has not yet found an application for brain research in education and that, conversely, brain researchers have not found practical applications for their research in the learning sciences. Notwithstanding the remarkable progress in fundamental research in the last decade, notably in mathematics and language, the number of findings that can be exploited or that have been exploited by the learning sciences remains sparse. This is probably due, *inter alia*, to the fact that up to now there has been little direct contact between "neuroscientists" and "learning scientists".

2.2. Scientific, institutional, and functional causes

There is little consensus on the *potential* advantages neuroscience can provide for learning sciences. On the one side there is optimism, on the other extreme scepticism. As such, we need to be cautious not to go too far in either extreme. At present, there are almost no direct links between these two domains, for at least four principal reasons:

- We know too little about brain function to reliably infer a rule that would enable us to understand intelligence and, thus, human cognition and behaviour;
- Many neuroscience specialists (from bio-geneticists to neurosurgeons) have not been particularly interested in seeking applications for their findings in learning issues. However, this project has received full support from the neuroscientists involved in the planning stage, most likely as a result that finally there will be a forum whereby educators and scientists can begin to speak through a common medium.
- Each field has a different reference point from which it operates. Learning scientists, engaged in what one would call an "*intervention discipline*" (having this feature in common with medicine for example), are used to working with a number of reference disciplines. Learning researchers or practitioners, or those who legitimate or prescribe educational methods, traditionally tend to look to "*description disciplines*", which provide them with theoretical models to define the content of teaching and teaching practice. However, leading edge disciplines such as bio-genetics or neurosurgery do not fall into the category of reference disciplines, nor are they directly concerned with the content of teaching or paradigms for teaching practice. They concern only a highly-specialised public and traditionally have not been understood by persons outside their domain;
- Though both cognitive psychologists and educational specialists can be thought of as relevant feedback mechanisms between neuroscientists and education policy makers, it is not certain that participants in these fields understand the significance of these connections.

2. 3. What already exists

There are already links between the study of brain structure and research into what this structure does from a functional perspective (intelligence, perception, memory, etc.); this is the field of neuroscience. There are also links between research into the human mind and research on the resulting behaviour (which concerns the individual in various environments -- teaching/learning, work, social relations in the broad sense, etc.) and this is the area of the learning sciences and of their reference disciplines such as psychology, sociology, anthropology etc.

3. Objectives

3.1. An idea that is simple to define...

The basic purpose of this initiative has been simple:

A/ **To bring together people who**, because they work in disciplines, which institutionally and functionally are very remote from one another, **do not know each others work and/or interests**, and in doing so, establish a direct link between brain specialists and learning specialists. We can thus imagine a virtually spontaneous generation of creativity that could have surprising results, which at present is missing between the two epistemological links described above. The challenge is to bring together in a forum, in a common project, neuroscientists, learning scientists, and policy makers in the hope that the resulting mental alchemy will yield new approaches and new ideas about how what the brain does is educationally relevant.

B/ **To involve these people in a dialogue with policy makers within the OECD member countries.**

Not being involved, by definition, in academic quarrels, CERI is the ideal neutral forum for launching this kind of multidisciplinary approach to multinational problems. One of the hallmarks of CERI since its foundation has been to bring together specialists from different cultural and institutional backgrounds on horizontal projects, and link them directly to policy makers (i.e. political decision makers) within OECD member countries. The experience it has acquired in the delicate task of joining high-level international experts, qualifies it more than any other institution for this venture. It is necessary to have "catalysts" too, to set in motion the reaction (i.e. the emergence of new ideas and new creative processes), of eventually producing a successful blend of two seemingly disparate fields. These catalysts can be scientists from other fields, sociologists, philosophers, politicians, or economic decision-makers -- in short, non-specialists interested in this topic, who will spark the debate and question the specialists.

3.2. ...but difficult to put into practice.

In view of what has been stated earlier, it has been a challenge to put this idea into practice. It is not easy, nor without risks, to confront entrenched habits or established positions. Our purpose is to involve everybody's participation. However, it has been necessary to proceed cautiously so as not to unduly elicit or exacerbate reactions of scepticism, indifference, or defensiveness. The aim has been to ensure that all participants irrespective of discipline benefit from the forums. If these fora had been organised on traditional top-down lines, with, on the one hand, description disciplines (neuroscience) being on top, and, on the other hand, intervention disciplines (learning sciences) at the bottom, it would not encourage a reciprocal dialogue so necessary to change. However, we find that researchers in neuroscience are starting to want to find applications for research that provides information on how the brain functions and how people acquire knowledge. Concurrently, educators and policy makers are interested in meeting high standards for student learning. With CERI and the "Brain Fora", the merging of these two trends can provide the possibility of designing curricula on solid brain/mind research.

3.3. Structure of the fora and outcomes

After the planning meetings, the following approach was chosen:

- a/ To organise three high-level fora between June 2000 and April 2001, thus structuring the debates around three ages of life: early learning, youth learning, and adult learning;
- b/ To comply with both balance and international representation, having one forum organised in North America, one in Europe and one in the Pacific area;
- c/ To engage between 30 and 40 participants who will meet during two days for each forum (15-20 cognitive neuroscientists, 10-12 education specialists – scientists, policy-makers, and practitioners-, and 5-8 “catalysts”- politicians, managers, and sociologists) to work on an agenda established in advance;
- d/ To produce a report after each forum, and to publish a major report at the end of the series to disseminate the results;
- e/ To start to contemplate the feasibility of a major forum to be held after the three high-level fora, with possible continuation as an annual event to report changes in educational policy and inform participants of new developments in the neurosciences.
- f/ To establish an international network of researchers and policy makers who will, after the third forum, continue to work co-operatively, on 3-5 specific topics particularly relevant for exploring the implications for education policy change and practice.

4. Players and human resources

4.1. Experts to be invited: the "Brain Trust"

This is one of the most sensitive and pressing issues one had to address. After one year of planning work, a list of people in Europe, the United States and Japan had been targeted to be associated with this high-risk venture. The first aim was to determine what type or groups of individuals to establish contact with and, then, to start drawing up a list of names for inclusion in this "inner circle". The participants in the two planning meetings, which took place at OECD headquarters (Paris), in July 1999 and January 2000, belong to this circle. They referred others and thus helped the list to take shape. As the bibliographic search proceeded, the list has been expanded on a more systematic basis to obtain the needed names for the "Brain Trust".

In addition, a number of personalities have been identified as possible catalysts, in various fields. One or two experienced journalists as moderators, together with a number of politicians with wide-ranging interests, and top managers from industry would ensure widespread media coverage of events.

4.2. Partnerships

Once the conceptual basis of the project had been established, initial discussions began with major research and funding institutions: Sackler Institute, New York City (USA), University of Granada (Spain), and RIKEN Brain Science Institute (Japan); National Science Foundation (USA) and the Lifelong Learning Foundation (UK); and INSERM (France). After having obtained full support for the project from the OECD Member countries (CERI Governing Board Meeting, November 23rd, 1999), CERI is currently being expanding the "partnership" aspect of the project in terms of possible collaborators, including local and regional authorities which have shown interest for the topic (for example, in the case of Spain, with the City of Granada and the Andalusia Region being included as major partners).

5. Timetable

- **16-17 June 2000, New York City (Sackler Institute - Cornell University), USA:
First high-level forum on "Brain Mechanisms and Early Learning";**
- **1-3 February 2001, Granada (University and City of Granada), Spain:
Second high-level forum, on "Brain Mechanisms and Youth Learning";**
- **26-27 April 2001, Tokyo (RIKEN Brain Science Institute), Japan:
Third high-level forum, on "Brain Mechanisms and Learning in Ageing".**