

THE NATURE OF LEARNING – USING RESEARCH TO INSPIRE PRACTICE

(Edited by Hanna Dumont, David Istance and Francisco Benavides)

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CHAPTER ONE

ANALYSING AND DESIGNING LEARNING ENVIRONMENTS FOR THE 21ST CENTURY

Hanna Dumont and David Istance

(University of Tübingen Germany, and OECD, Paris)

Hanna Dumont and David Istance set out the reasons why, over recent years, learning has moved increasingly centre stage politically. These include the nature of knowledge economies and societies, the demands of 21st century competences, the ubiquity of ICT, frustration with the success of repeated education reforms, and the burgeoning learning research base. They call for harnessing knowledge about learning and applying it more systematically to education. The chapter argues why these developments call for a particular focus on innovative “micro” arrangements - “learning environments” – which are conceptualised in this OECD work at a level between individual learners and conventional educational parameters. The chapter locates the book as seeking to address the “great disconnect” (as it has been called) between research, on the one hand, and policy and practice, on the other.

CHAPTER TWO

HISTORICAL DEVELOPMENTS IN THE UNDERSTANDING OF LEARNING

Erik de Corte

(University of Leuven)

Erik de Corte describes a progression in which earlier behaviourism gave way increasingly to cognitive psychology with learning understood as information processing rather than as responding to stimuli. More active concepts of learning took hold (“constructivism”), and with “social constructivism” the terrain is not restricted to what takes place within individual minds but as the interaction between learners and their contextual situation. There has been a parallel move for research to shift from artificial exercises/situations to real-life learning in classrooms and hence to become much more relevant for education. The current understanding of learning, aimed at promoting 21st century or “adaptive” competence, is characterised as “CSSC learning”: “constructive” as learners actively construct their knowledge and skills; “self-regulated” with people actively using strategies to learn; “situated” and best understood in context rather than abstracted from environment; and “collaborative” not a solo activity.

CHAPTER THREE

THE COGNITIVE PERSPECTIVE ON LEARNING: TEN CORNERSTONE FINDINGS

Michael Schneider and Elsbeth Stern

(ETH Zurich, Institute for Behavioural Research)

Michael Schneider and Elsbeth Stern place knowledge acquisition at the very heart of the learning process, albeit that the quality of the knowledge is as necessary as the quantity and that “knowledge” should be understood much more broadly than (but including) knowing facts. They summarise the cognitive perspective through ten “cornerstones”. Learning: i) is essentially carried out by the learner; ii) should take prior knowledge importantly into account; iii) requires the integration of knowledge structures; iv) balances the acquisition of concepts, skills and meta-cognitive competence; v) builds complex knowledge structures by hierarchically organising more basic pieces of knowledge; vi) can valuably use structures in the external world for organising knowledge structures in the mind; vii) is constrained by the capacity limitations of human information-processing; viii) results from a dynamic interplay of emotion, motivation and cognition; ix) should develop transferable knowledge structures; x) requires time and effort.

CHAPTER FOUR

THE CRUCIAL ROLE OF MOTIVATION AND EMOTION IN CLASSROOM LEARNING

Monique Boekaerts

(Leiden University, Netherlands and Katholieke Universiteit, Leuven, Belgium)

Monique Boekaerts posits that the role of emotions and motivations has been seriously neglected in the design of learning arrangements and teacher professional development. She summarises knowledge about the key role of emotions and motivations around a small number of principles. Students are more motivated to engage in learning when: they feel competent to do what is expected of them and perceive stable links between actions and achievement; they value the subject and have a clear sense of purpose; they experience positive emotions towards learning activities and, contrariwise, turn away from learning when they experience negative emotions; and when they perceive the environment as favourable for learning. Students free up cognitive resources when they are able to influence the intensity, duration, and expression of their emotions, and are more persistent in learning when they can manage their resources and deal with obstacles efficiently.

CHAPTER FIVE

LEARNING FROM THE DEVELOPMENTAL AND BIOLOGICAL PERSPECTIVE

Christina Hinton and Kurt W. Fischer

(Harvard Graduate School of Education)

Christina Hinton and Kurt Fischer consider first how genetics and experience interact to guide development, and how learning experiences literally shape the physical structure of the brain. They stress how cognition and emotion work in tandem. The chapter reviews research on how the brain acquires core academic abilities, including language, literacy, and mathematics, and discusses dysfunctions in these abilities. The brain is biologically primed to acquire language even if the structures involved change over the lifespan, while the capacity for literacy, on the other hand, is built over time with cumulative neural modifications and varies depending on the language in question. Similarly, different instruction shapes the neural circuitry underlying mathematical abilities. Neuro-scientific research has underpinned key findings regarding learning, such as the extent of individual differences and the essential social nature of human learning, which means that learning environments should incorporate multiple means of representation, assessment, and engagement.

CHAPTER SIX

THE ROLE OF FORMATIVE ASSESSMENT IN EFFECTIVE LEARNING ENVIRONMENTS

Dylan Wiliam

(Institute of Education, University of London)

Dylan Wiliam describes assessment as the bridge between teaching and learning. The concept of “formative assessment” emerged with recognition of the importance of feedback and application of navigational metaphors about staying on course through corrective steering. There is substantial evidence, reviewed here, on how feedback improves learning but most studies suffer from weak conceptualisation and neglect of longer-term impacts. The definition here emphasises the role of assessment in improving the quality of instructional decisions. It can be seen as entailing five “key strategies”:

1. Clarifying, sharing and understanding learning intentions and criteria for success.
2. Engineering classroom activities that elicit evidence of learning.
3. Providing feedback that moves learners forward.
4. Activating students as instructional resources for one another.
5. Activating students as owners of their own learning.

Formative assessment is proposed as a process of capitalising on, “moments of contingency” for the purpose of regulating learning processes.

CHAPTER SEVEN

CO-OPERATIVE LEARNING: WHAT MAKES GROUP-WORK WORK?

Robert E. Slavin

(University of York and Johns Hopkins University)

Robert Slavin reviews the substantial body of studies of co-operative learning in schools, in particular those using control groups being taught with more traditional methods. There are two main categories – “Structured Team Learning” and “Informal Group Learning Methods” – each reviewed and illustrated. As regards affective outcomes, co-operative learning overwhelmingly shows beneficial results. For achievement outcomes, positive results depend heavily on two key factors. One is the presence of group goals (the learner groups are working towards a goal or to gain reward or recognition), the other is individual accountability (the success of the group depends on the individual learning of every member). The chapter presents alternative perspectives to explain the benefits of co-operative learning - whether it acts via motivations, social cohesion, cognitive development, or “cognitive elaboration”. Despite the very robust evidence base of positive outcomes, co-operative learning “remains at the edge of school policy” and is often poorly implemented.

CHAPTER EIGHT

LEARNING WITH TECHNOLOGY

Richard E. Mayer

(University of California, Santa Barbara)

Richard Mayer argues that few of the many strong claims made for the transformative potential of new technologies have been convincingly tested against research evidence. A major reason is that too often a “technology-centred”, as opposed to a “learning-centred”, approach is followed. A convincing theory of how people learn with technology can be based on three important principles: “dual channels” (people process sound and visual images separately), “limited capacity” (people can only process a small amount of sound or image at a time), and “active processing” (meaningful learning depends on engagement in appropriate cognitive processing). These are explained and applied to argue that effective instruction with technology helps cognitive processing in learners without overloading their cognitive system; this can be achieved by reducing extraneous processing, managing essential processing, and fostering generative processing. How this can be done applying different techniques and principles, together with supportive evidence, are presented in detail.

CHAPTER NINE

PROSPECTS AND CHALLENGES FOR INQUIRY-BASED APPROACHES TO LEARNING

Brigid Barron and Linda Darling Hammond

(Stanford University School of Education)

Brigid Barron and Linda Darling-Hammond summarise three, often overlapping, families of inquiry-based learning: “project-based”, “problem-based”, and “learning through design”. A first key conclusion of their review of research evidence is that students learn more deeply when they can apply classroom-gathered knowledge to real-world problems; inquiry-based approaches are important ways to nurture communication, collaboration, creativity, and deep thinking. Second, inquiry-based learning depends on the application of well-designed assessments, both to define the learning tasks and to evaluate what has been learned. Third, however, the success of inquiry approaches tends to be highly dependent on the knowledge and skills of those implementing them. If these approaches are poorly understood and mistaken for being unstructured, their benefits are substantially reduced compared with when they are implemented by those appreciating the need for extensive scaffolding and constant assessment to inform their direction.

CHAPTER TEN

THE COMMUNITY AS A RESOURCE FOR LEARNING: AN ANALYSIS OF ACADEMIC SERVICE-LEARNING IN PRIMARY AND SECONDARY EDUCATION

Andrew Furco

(University of Minnesota)

Andrew Furco's chapter reviews "academic service learning": i.e. experiential learning that takes place in the community as an integral part of the curriculum. These approaches are arousing substantial international interest and embrace pedagogies of engagement; pedagogies of empowerment; national service programmes; values education initiatives; citizenship education programmes; and community resource programmes. They lie between community service and volunteer work, at the service end of the spectrum, and field education and internships, at the learning end. Different forms of service learning are of value in themselves as good education. They also positively influence cognitive achievements in ways discussed in other chapters of this volume, such as by giving opportunities for authentic learning, engaging students actively, fostering co-operation and collaboration, meeting individual interests, empowering learners, and extending horizons beyond comfort zones. However, the evidence base on associated outcomes and on what works best and why remain seriously under-developed.

CHAPTER ELEVEN

THE EFFECTS OF FAMILY ON CHILDREN'S LEARNING AND SOCIALISATION

Barbara Schneider, Venessa Keesler, and Larissa Morlock

(Michigan State University)

Barbara Schneider, Venessa Keesler, and Larissa Morlock address (a) how families influence children's learning development, (b) what families influence and (c) when this influence takes place. Socio-economic status exercises a profound influence on student learning yet is not simply deterministic as individual families play a key role, arguably a more important one than schools in shaping educational expectations, occupational aspirations and academic performance. Research shows how children's well-being and development are influenced by the engagement of both mothers and fathers. Children are more likely to learn when they have structured home environments with clear expectations about learning but adapted to child-specific needs and personalities. The socialisation received at home is critical to the development of ambition and perceived self-efficacy. Engaging in extra-curricular activities and parental involvement in schooling both show positive results, but they are beneficial particularly when they are consistent with the goals and activities of the school.

CHAPTER TWELVE

IMPLEMENTING INNOVATION: FROM VISIONARY MODELS TO EVERYDAY PRACTICE

Lauren B. Resnick, James P. Spillane, Pam Goldman, and Elizabeth S. Rangel

(University of Pittsburgh and Northwestern University)

Lauren Resnick, James Spillane, Pam Goldman, and Elizabeth Rangel observe the lack of impact of the learning sciences on teachers' practice, identifying the reliance on "telling" as professional development and overly individualised perspectives as at cause. They also note the in-built conservatism and resistance to innovation of schools and school systems, and the gap between classroom practice, on the one hand, and the policies of organisations and systems, on the other. The authors argue for much greater attention to be given to the sociological understanding of organisations, organisational routines, and the role of professional learning communities. To enable change to happen, they identify the importance of "kernel routines" for seeding and propagating change focused on teaching and learning. Resnick *et al.* present and discuss two such routines. The first develops instructionally-focused leadership teams in schools and the second aims at direct improvement of teaching and learning through content-focused professional development.

CHAPTER THIRTEEN

FUTURE DIRECTIONS FOR LEARNING ENVIRONMENTS IN THE 21ST CENTURY

David Istance and Hanna Dumont

(OECD and University of Tuebingen, Germany)

David Istance and Hanna Dumont summarise the key conclusions that emerge from the different chapters taken together. Learning research strongly suggests that an effective learning environment is one that:

- Makes learning central, encourages engagement, and in which learners come to understand themselves as learners.
- Is where learning is social and often collaborative.
- Is highly attuned to learners' motivations and the importance of emotions.
- Is acutely sensitive to individual differences including in prior knowledge.
- Is demanding for each learner but without excessive overload;
- Uses assessments consistent with its aims, with strong emphasis on formative feedback.
- Promotes horizontal connectedness across activities and subjects, in- and out-of-school.

The chapter presents the educational agenda – learner-centred, structured, personalised, social, and inclusive - consistent with these conclusions, before discussing some of the tricky issues related to implementation.