

# **What does it mean to be good at ICT?**

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This document consists of the 'script' and most of the slides from my presentation at the School Research Conference.

## ***Introduction***

What is ICT? What does it mean to be good at ICT? Last year a team of people from Leeds observed some ICT assessments in order to look for non-construct relevant sources of difficulty. In doing this we realised that the construct of ICT is not well-understood; rather, it is assumed. Furthermore, there seems to be little general research or theory that addresses the nature and process of learning ICT. I will present a preliminary attempt to create a theoretical model of ICT competence which draws on Activity Theory but is based mainly on a belief that language learning is the nearest reasonably well-understood process to ICT development.

## ***Young people and ICT***

One of the ways that ICT is different from any other curriculum subject is in the relationship that pupils have to the field.

Most adults would probably conceptualise ICT as 'working with computers'. However information and communications technologies in the daily worlds of children include equipment such as games consoles and mobile phones as well as computers. Handheld consoles such as the Nintendo™ DS or Sony™ PSP, for example, are not only part of children's leisure time but are also being used as tools for learning. The wireless capability built into such consoles allows them to access the internet and users can write on the touch-sensitive screens. The child's world of ICT also includes a wealth of social and leisure experiences in online environments such as SecondLife™.

Prensky talks about 'digital immigrants' - most of us here, and 'digital natives' - children growing up in the world of digital technologies. This isn't a particularly new concept - Prensky's paper was written in 2001 (incidentally when the first picture was taken).

When we looked at ICT assessments it seemed that they had been designed by digital immigrants, for the world of digital immigrants. For example, screenshots of the Key Stage 3 ICT tests show familiar office-type applications (<http://www.naa.org.uk/naaks3/302.asp>).

As I said earlier, young people's relationship to ICT is different to their relationship with other curriculum subjects. Although all subjects feature in everyday life, in most cases, the subject as an area of study is well-defined and well-understood before children come to it. With ICT the difference is that children and young people are actively involved in shaping the field. More, than that, their interests and spending power are major drivers of the development of digital technologies. In ICT, young

people are creating the technological world in which they are growing up and it's not clear that we as adults (and curriculum developers) understand that world.

### ***The construct of ICT***

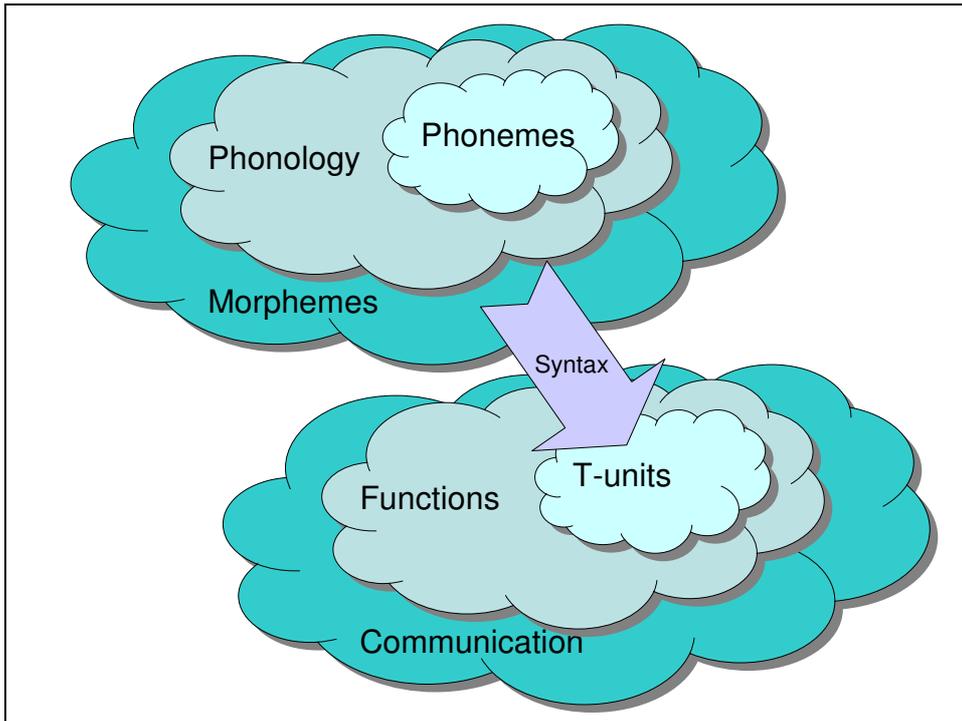
I said earlier that the construct of ICT is not well-understood. The national curriculum has a lot to say about what ability in ICT consists of and these were used as the basis for the tests that we observed. However, many of these are vague and general statements that could be applied to many areas of work - not only ICT. For example, awareness of audience is needed in anything that involves communication - even buying a birthday card, whether ICT is used or not. Certainly, if you don't have awareness of audience then learning to use ICT will not give it to you. Again, students need to be able to find and evaluate information from different sources. This is a general skill that is needed across all areas of the curriculum - not only ICT and might even be argued to be subject specific. In addition, there is the question of whether what adults - immigrants to the digital world - would consider to be 'good at ICT' is the same as the skills that young people - creators of the digital world - would consider to be necessary skills for using technology.

Why does it matter? Without a clear understanding of the construct it's very hard to know what to teach and what to test. Had the KS3 national tests of ICT become statutory then the backwash would have defined the ICT curriculum as mainly about learning to use office applications (although this is largely already the case). Even though the tests are now offered as non-statutory formative assessment, it is likely that OFSTED will expect to see them in use and so they will still be a strong influence on the curriculum. Furthermore, there are plenty of other assessments at KS4 which depend heavily on office / business applications and work.

I don't entirely agree with Prensky's 'digital natives / digital immigrants' view. I think that what is really happening is more analogous to a digital pidgin and digital creole. However, whichever we take, it seems that it may be useful to look at ICT learning as similar to language learning.

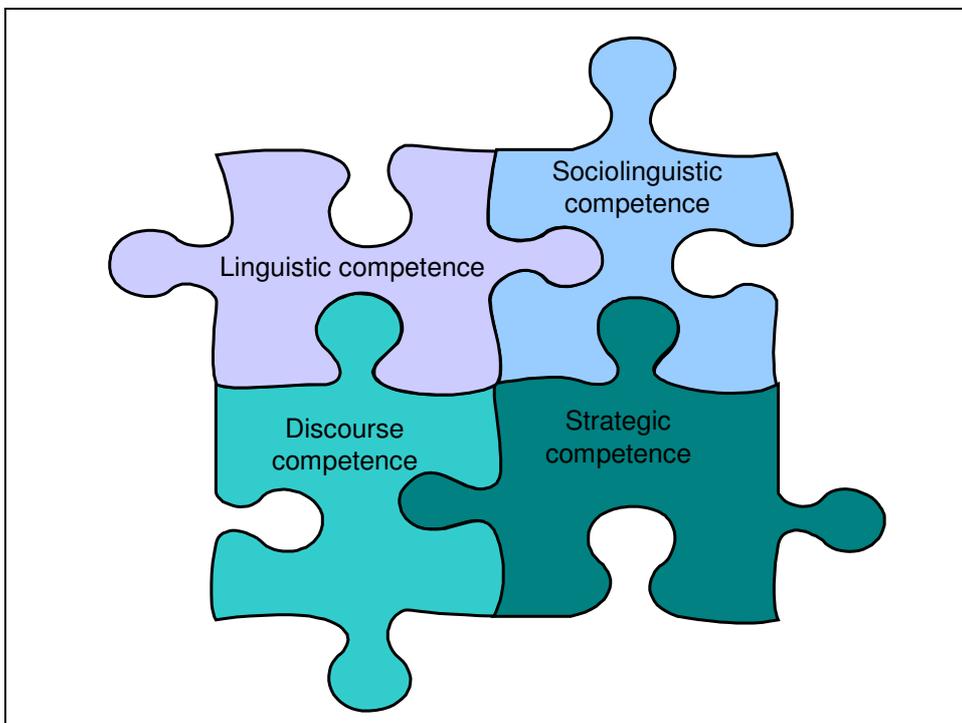
### ***ICT and Language***

So, can we theorise that ICT is like language? What are the basic elements of language? Language can be broken down into the components on Slide 1. At the most basic level there are phonemes - the sounds from which spoken language is constructed. There is a huge range of possible phonemes but only a few make up the phonology of any individual language. Phonemes can be combined into morphemes (words). The phonology determines which combinations of phonemes are allowable in a language (or dialect). Of course individual phonemes can sometimes be allowable words - or even, in Yorkshire, complete paragraphs! Morphemes are linked by syntax into semantic units (I've put t-units - as the smallest units of meaning - on the slide to save space).



Slide 1

However, language is not just about making meaning, it's about the things that we do with it – the functions that we accomplish through the use of language – greeting, explaining, apologising and so on. All of this is within the overall goal of successful communication – communicative competence – which can be broken down into the competences on Slide 2 (Canale and Swain, 1980).



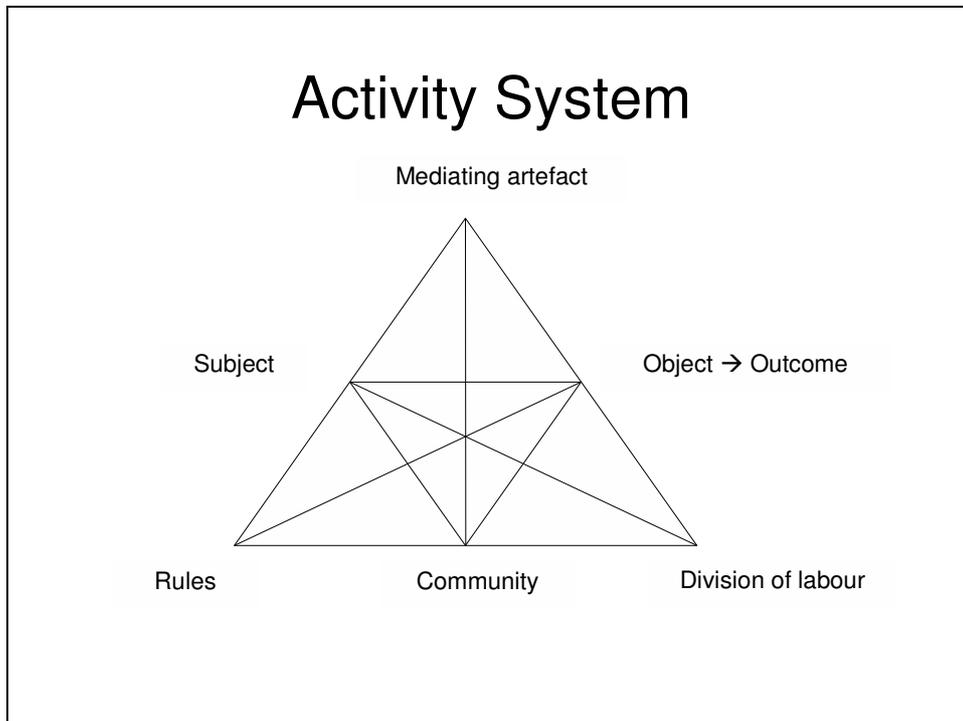
Slide 2

- Linguistic competence is the fitting together of sounds, words and grammar – knowing how the language works.
- Sociolinguistic competence is understanding how language is used in context – knowing what words and phrases are appropriate in any particular setting to achieve a desired communicative purpose.
- Discourse competence is knowing how to create and use larger pieces of language (discourse, in fact) to make a speech, write a letter, conduct a conversation and so on.
- Strategic competence is understanding how to manage and navigate communication – how to repair communication breakdowns and how to work around unfamiliar areas of language.

The challenge for language teaching and testing is what level of the language ‘model’ to work to. Children immersed in a language naturally learn all aspects of language simultaneously. When we, as adults (or even as teenagers) learn language we have to learn these elements separately and painstakingly. We have to learn how to make the sounds, we learn the vocabulary and we struggle with the grammar. Without a certain level of linguistic competence, we can’t communicate so do you start with explicit teaching of pronunciation, grammar and vocabulary and hope that communication will develop from these or do we start by trying to teach other aspects of communication and hope that the linguistic competence will develop alongside them?

The same conundrum exists for ICT teaching. Do you teach keystrokes, applications or outcomes?

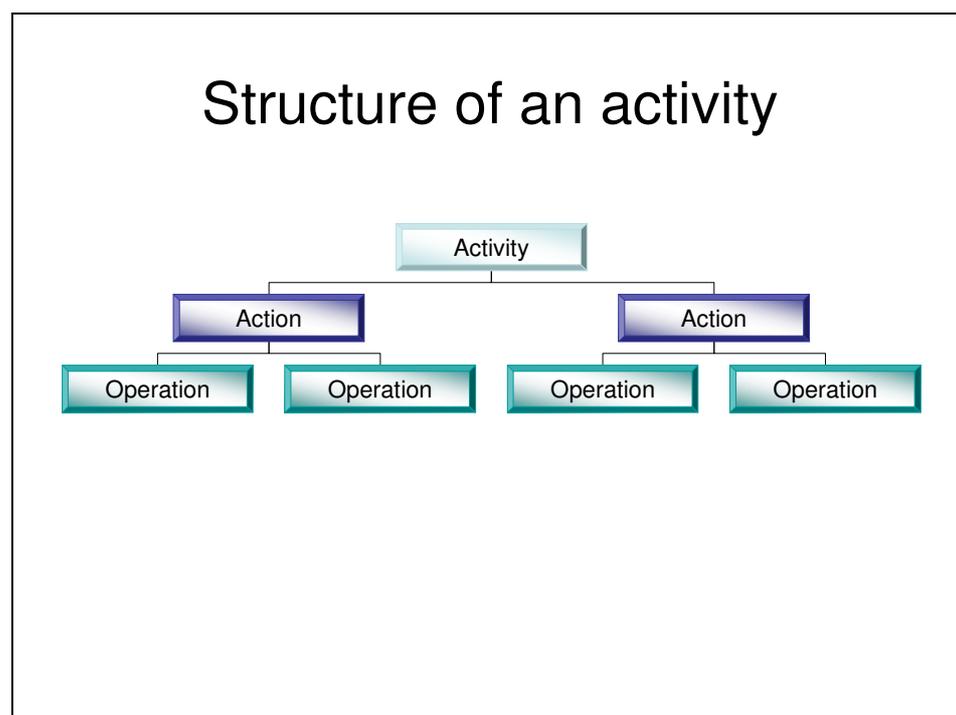
### **Activity Theory**



Slide 3

Slide 3 shows Engeström's Activity System triangle (Cole and Engeström 1993). Activity theorists, as you know, argue for an activity system, saying that is only in the context of a system that many human undertakings make sense. The subject, a person, works towards an object (immediate goal) in order to achieve an outcome. The activity is mediated by tools which might be either concrete or abstract. For example, in this activity I am the subject and my desired object is to communicate my ideas to you; this is mediated by the tools of language and the computer equipment. An activity happens within a social context which has rules and ways of dividing up the work within the activity system. This, by the way, is part of what needs to be taught to adult language learners in order that they can develop sociolinguistic competence.

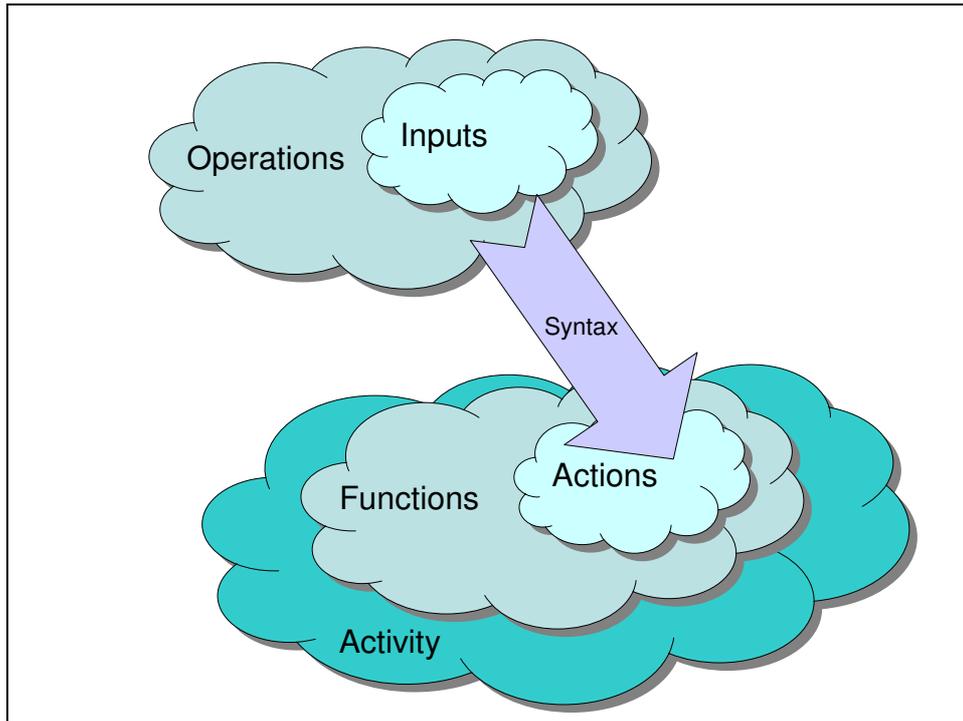
An activity can be broken down into actions which consist of operations (Slide 4). Actions make sense in themselves and may, in fact, be sufficiently complex to be viewed as activities in their own right (possibly in other contexts). Operations are the smallest units in the activity. For example, in the micro-activity 'getting ready in the morning', 'brushing teeth' is an action and 'squeezing toothpaste onto the brush' is an operation.



Slide 4

### ***Towards a framework for ICT competence***

It seems to me that the basic elements of ICT could be conceptualised as shown in Slide 5.

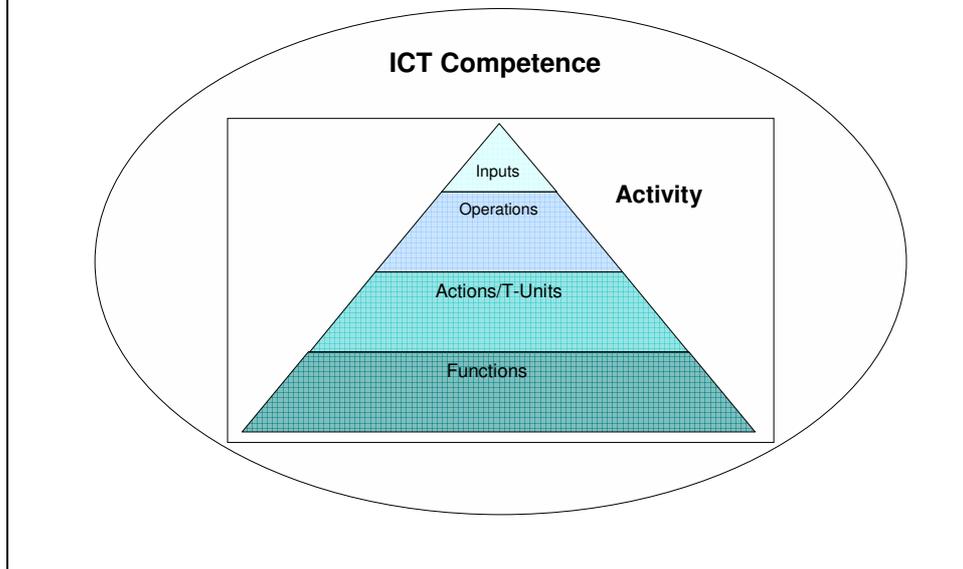


Slide 5

- Phonemes – individual keystrokes, mouse movements or mouse clicks or other single **inputs**
- Morphemes – single inputs or combinations of keystrokes/movements/clicks to perform a single **operation** (for example, ‘copy’)
- Syntax – the ways in which operations can be combined to create useful **actions** (for example, ‘paste’ must always be preceded by ‘cut’ or ‘copy’).
- T-units – combinations of operations that lead to meaningful **actions** (for example, copy and paste or cut and paste). Unlike language, only grammatical actions can be meaningful in ICT.
- **Function** – (combination of actions to achieve a specific task, for example, writing and sending an email) which has coherence in itself
- **Activity** – a task to be accomplished using ICT
- Communicative **ICT competence** – the ability to use ICT effectively to achieve desired outcomes within activities

From this I propose a framework which looks like this (Slide 6):

# A Framework for ICT Competence



## Slide 6

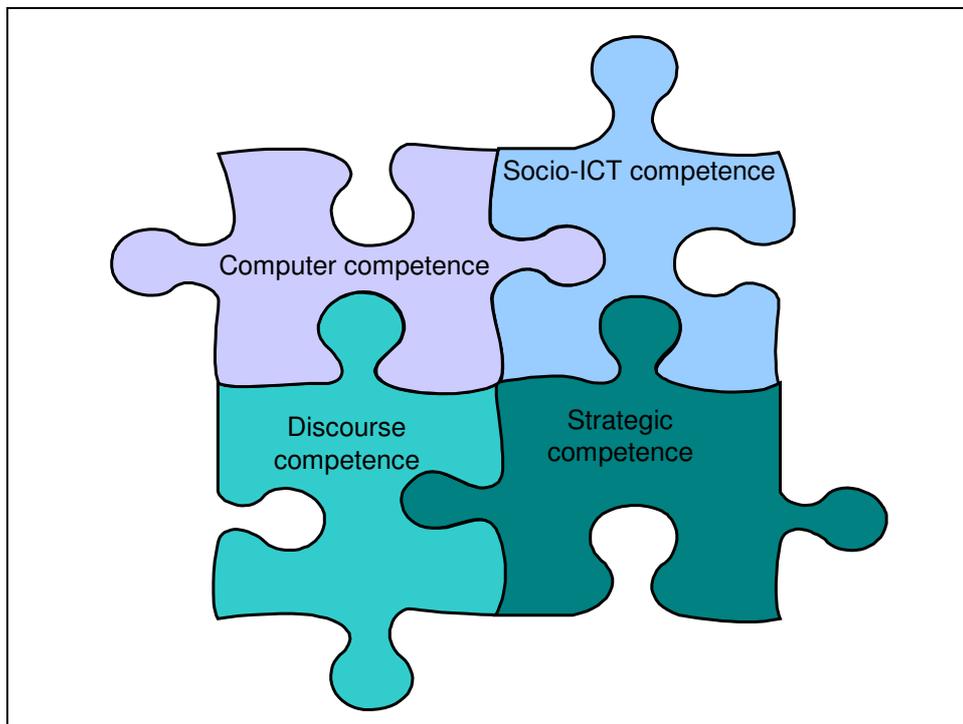
Containing everything we have 'ICT competence'. We then have a possibly teachable and assessable level of 'activity'. However, an ICT activity can be accomplished in a number of ways depending on the available tools and the social context. Furthermore, the functions that can be used to achieve the outcome of an activity are subject to change as technology develops – that's both in terms of the physical technology and the social context.

However, functions are clearly both teachable and assessable – the question is the extent to which we want specific functions embedded in the curriculum. It is not inconceivable, for example, that email will drop out of the communications repertoire to be replaced by other forms of messaging.

This is true of all levels of the pyramid. Ctrl-C, for example, at the moment is a useful operation within the action 'copy and paste'. This will only be true for as long as we use keyboards. If/when we move on from keyboards then the operation 'ctrl-c' will become obsolete even though the 'copy/paste' action will still be valid. So, the higher up the pyramid, the more the element is tied to physical aspects of the technology.

As with language teaching, the mechanical levels are, in some ways, easier to teach. Learning of functions and development of competence must be situated, that is, they must occur within contexts that are real and meaningful to the learner. Furthermore, as activity theorists argue, human activity is situated within a community which has practices and rules. True communicative competence requires understanding of these rules and the ability to work or behave appropriately within the constraints of the social context. If the teacher and pupil exist in different ICT communities then the constructs of ICT competence will be different leading, again, to mismatched understandings.

Slide 7 shows Canale & Swain's model of communicative competence adapted for ICT.



#### Slide 7

- Computer competence (which I have since renamed 'procedural competence' is the ability to manipulate the technology both in terms of hardware and applications.
- Socio-ICT competence is the understanding of what is appropriate to use in different social contexts and knowledge domains, in terms of both technology and language.
- Discourse competence is the ability to manage an extended task possibly using several applications and/or types of hardware.
- Strategic competence is the ability to repair problems and work around the gaps in ICT knowledge and skills.

The work that I have presented represents thinking that is still in development and so I welcome feedback. If you have any comments please email me:

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#### **References**

- Canale, M. and Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics 1*, 1-47.
- Cole, M. and Engeström, Y. (1993). A Cultural-Historical Approach to Distributed Cognition. In Distributed Cognitions: Psychological and Educational Considerations. G. Salomon. Cambridge, Cambridge University Press: 1-47.
- Prensky, M (2001) [Digital Natives, Digital Immigrants](http://www.marcprensky.com) *On the Horizon* 9:5 (available online form [www.marcprensky.com](http://www.marcprensky.com))