



technology, children, schools and families

Knowledge, creativity and communication in education: multimodal design

Gunther Kress & Jeff Bezemer, Centre for Multimodal Research, Institute of Education, University of London

March 2009

Introduction

The focus of this review is on the multimodal design of environments for knowledge construction, creativity and communication. In education, multimodal design refers to the use of different 'modes', such as image and writing, to recontextualize a body of knowledge for a specific audience. These designs may come to the learner via print media or via the screen, at home or in the classroom. We sketch out some changes in multimodal design in education over the past, and in the present, and attempt to speculate on future trends. We start our review with a sketch of the emergence of the notion of design in education and beyond as a new perspective on knowledge, creativity and communication. We then discuss four examples of learning materials to illustrate these trends. The first two examples demonstrate what has changed in the 20th century, and the second two examples show in which directions current changes are heading. All four examples show how multimodal designs shape the social and representational environment of learners. In the following section we suggest that such multimodal designs are no longer the exclusive realm of the 'professional' textbook maker, nor even of the teacher alone: young people have become active participants in design. We conclude with a summary of key trends.

Keywords: technology, multimedia, design, society, creativity, knowledge, literacy

Design in educational environments

In many parts of the Humanities and the Social Sciences the term 'design' has, quite recently, come into widespread use. Certainly that is the case, among others, in communication and in education. As with any term that suddenly acquires fashionability, one needs to ask: 'what are the reasons?' and 'is this more than mere fashion?' Might the use of the term be an indicator of corresponding changes in the larger social environment? From a historical perspective of these areas, say over the last 70 to 80 years, it is possible to trace a path which starts with *convention* and *adherence to convention* – a period from the 1930s into the late 1950s, solidly founded on power and the working of power in communities. From the 1960s on and into the mid 1980s we saw a move to *critique*. In education, critique – as in 'being a critical reader' – has settled into a near commonsense mainstream position. Now, at the beginning of the 21st century,

design is seemingly challenging to become a prominent, maybe the central, term in this respect.

To take two key concepts – *text* and *knowledge* – as examples. Texts, whether as essay, report, or ‘story’, used to be *composed*, in line with relatively well understood and settled generic conventions as a guide. Then it seemed to become essential to begin questioning the processes of *composition*, to subject the status of the *generic conventions* to *critique*, to challenge the power that seemed manifested in the processes and conventions, as they seemed to work to the benefit of some and to the detriment of others. Critique works in relation to stable environments, and its task is to bring these into crisis. Environments marked by instability, provisionality, and fluidity do not lend themselves to critique; such environments demand the shaping force of design.

In contemporary conditions *knowledge* is *made*: in wikis, in blogs, but also – without fuss or notice – in everyday conversation, in instances of entirely commonplace, unremarkable, banal interaction. Canonical knowledge is challenged everywhere and under attack: whether in the natural sciences – witness the rows around theories of evolution vs ‘intelligent design’ or in any domain of social life. Canonical *representations* of knowledge have become unstable, whether as *mode* (*writing* vs *image*) or as genre (the *essay* vs the *narrative* or the *cartoon*, etc): *writing* as the canonical mode par excellence previously is giving way to representation as *image*. The school is given the task of upholding canonical forms of knowledge (and canonical forms of representation, eg through the National Literacy Strategy); though without the support of a clear direction from society, never mind that of a state which faces the plurality of voices of a profoundly diverse society. Universities are not immune to these conditions: Wikipedia appears as source of reference in student work – even at PhD level – with other internet sites and alongside the canonical media of the book and the journal.

Knowledge and *meaning*, as much as the *texts* and *objects* which are their material realizations, are beginning to be seen as the outcomes of processes of *design*. Education, founded on knowledge, rests on *design*, its requirements and principles, whether overtly acknowledged or implicitly practiced. That is the case in relation to the design of environments of education, environments of learning and teaching, of materials and of the media involved. *Design* is at issue in the shaping of the social relations of pedagogy as in the social relations embedded in curricula. *Design* is the arrangement of an ensemble: of an object to be worked on or with, of a tool for an action with or on the object, integrated in specific ways into the capacities and affordances of the human body, a body with a history of experience of other, prior social processes, and subject more or less, and in different ways, to social regulation of the process. The *design* of a learning environment configures relations of body and tool, of tool and object; it also configures relations of affect. The design of, say, a textbook, is more than graphic design: it is the design of a complex ensemble, of an environment of social processes and configurations of social relations, of social purposes, goals, aims, tasks; and of affect.

There is a multiplicity of *social* reasons for the emergence of *design* as a metaphor for contemporary knowledge production, creativity and communication: *instability of social environments* (ie the fragmentation, disappearance of stable, reliable, ‘accepted’ conventions), the strong insistence and ‘assumption’ of *agency* by individuals – including children at ever younger ages (a result of the dominance of the market rather than the state as the major social/political force, with a change from notions of social responsibility to individual choice), the *multiplicity of resources* available in shaping realizations of meaning, including the meanings of identity. The *instability of social environments* has removed clear models for action, behaviour, etc and requires that individuals take responsibility for their actions. The *assumption of individual agency* – fostered and even forced by the state and fostered and urged by the market – means that the shaping of individual identity becomes a matter of *individual design*. The

multiplicity of resources offered by the market provides the means for the individual's shaping of identity - though with means provided by the market - and makes it a requirement that individuals assume responsibility for their shaping of meaning in their social environments.

Looking back

Educational media, such as textbooks, have undergone major changes over the last century (Bezemer and Kress, 2008; Bezemer and Kress, in press). Society has changed, curriculum and pedagogy have changed in line with social changes, consequently textbooks have changed, both in 'look' and in 'content'. If we compare a textbook published in 1930 with one published more recently, we can see - from the point of view of content - that the subject now includes material on 'popular' culture and media; pedagogically, there are now requirements to engage with these materials in groups, much more than before. But we can also see the *semiotic work* of design that has been done. There are full colour images on almost every page, both photographs and drawings, the layout of a text consisting of *writing* and *image* on the page now configured as a *site of display*, a *site of appearance*, could not have been imagined in 1930.

What has changed, in other words, is not just subject-content, not just the tasks which are set up for learners so as to engage with subject knowledge; what has changed is how these pedagogic interests are graphically realized on paper. Or rather, the 'look', the layout, the arrangement of the site of appearance is a graphic/visual realization of new social relations between the social participants in educational environments. The ordering, the arrangement of materials using the space of a page or screen is done from the perspective of an educator/*rhetor*, who has an eye equally on 'own interest', on 'audience', 'phenomenon to be communicated', 'broader social environment', 'effect of the arrangement'; in other words it instantiates the educational purposes in the design of the materials.

Designers use the resources for making meaning which are available and apt to serve their educational interests. The category of textbook designer includes authors as well as illustrators, editors, typesetters, and other professionals. Each of these professionals has available and uses specific resources with different potentials and constraints. Different resources - modes, genres, discourses - are apt for doing specific kinds of ontological, epistemological or pedagogic work. Professionals in this field potentially operate as teams, as an 'ensemble' and so bring their contribution to the overall design. Increasingly now teachers themselves act as rhetors/designers of digitally mediated materials, thus bringing their interests and agency into this semiotic work (Jewitt, 2008).

Figures 1 and 2 show two examples from Science textbooks which illustrate the range of changes in design that have taken place over the last 70 years or so. One example is from a Science textbook from 1935, the other one is from 2002. In both textbooks images are used to depict parts of the human body with writing directly attached to 'anchor' the images. But the placement of these 'chunks' on the page is different. In the 1935 textbook, placement seems to have followed the 'traditional' principle of 'insert-Figure X-about-here'. This principle suggests that *writing* is the central means of conveying meaning and is the major component of the text; *image* is subordinate to that. In the contemporary textbook, *writing* and *image* are placed in *parallel columns*. This principle suggests that *writing* and *image* are on an equal footing. In other words, the status relation between *image* and *writing* has shifted from an unequal to an equal position. Ontologically, this implies a shift in the valuation of modes and knowledge: from an ontology in which knowledge constructed in *writing* dominates over knowledge constructed in *image*, to an ontology in which these bases for knowledge have equal standing.

Animal Nutrition : Nutrition in Mammal 161

Digestion is the first stage of nutrition. It takes place in the *alimentary canal*. We shall now consider this process in detail.

The Alimentary Canal (fig. 148).

Food taken in at the mouth passes into and along a tube called the *alimentary canal*, the other end of which opens at

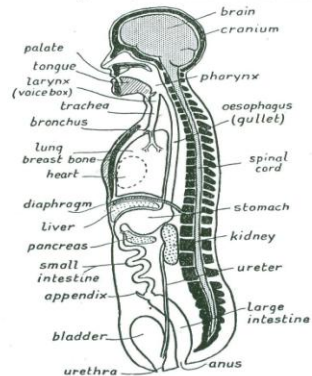


FIG. 148.—Chief internal organs of Man (simple scheme)

from the hind end of the body. The opening is the *anus*. From the *mouth* onwards the parts of the alimentary canal are the "back of the mouth" (*pharynx*), the *gullet* (*oesophagus*), the *stomach*, and the *gut* (*intestine*). The whole of the canal, including the mouth cavity, is lined with a soft pink tissue

CHAPTER XVIII
ANIMAL NUTRITION: NUTRITION IN THE MAMMAL

Introduction—In the Biology section of Part II we studied the structure of some simple animals and plants, and their life processes, *i.e.* how they obtain and use food, how they move, respire, excrete, and reproduce. In the present section we shall consider the structure and life processes of some higher animals and plants.

How Food is Used—We have already studied the chief *food-stuffs* (p. 156). They are the useful constituents of various substances used as food.

Food is used for two purposes within the body of an organism. It supplies *energy*, including *heat*, and it supplies substances which the living organism builds up into *protoplasm*. An organism needs energy because its active tissues expend energy. Some food-stuffs supply this energy. Active tissues also "wear away" and must be replaced. Growing organisms make additional tissue. New tissue, whether to replace waste or for growth, is made from certain food-stuffs which are built up into protoplasm.

Carbohydrates (p. 156) are the main source of energy. *Fats* (p. 158) supply heat. *Proteins* (p. 157), *salts*, and *water* are used in making protoplasm. **Respiration** is the process by which food sets free energy in the body of an organism. This will be studied in the next chapter. **Nutrition** includes the intake of food, and all the changes it undergoes in being converted into protoplasm. In this chapter we shall study the nutrition of those higher animals which are classed as

Mammals—A Mammal is a backboneed animal (*Vertebrate*). Its young are born alive: they do not "hatch" from eggs. They are suckled by the mother, who produces milk for this purpose. The Mammal has two pairs of limbs, each with (usually) five digits, and its body is more or less clothed with hair.

Figure 1: Excerpt from Fairbrother, Nightingale and Wyeth, 1935, pp161-162.

4 Digestion - the major stages

Animals need energy
Animals, as well as plants, need supplies of energy for their processes. The energy which animals need comes from sunlight which comes to us in the form of heat and light. Plants use this energy to make their own food. Animals get their energy from the food they eat. The energy which they get from their food is used for their life processes. The energy which they get from their food is used for their life processes.

Food glorious food
Perhaps the best way to see how food enters the body is to look at the human body. The food enters the mouth and goes down the throat to the stomach. The food then goes to the small intestine and then to the large intestine. The food is then excreted from the body.

Digestion
Digestion is the process by which food is broken down into small molecules which can be absorbed by the body. The food enters the mouth and goes down the throat to the stomach. The food then goes to the small intestine and then to the large intestine. The food is then excreted from the body.

What's to do?

1. A toothless dog "If there were no plants, there wouldn't be any animals either." Explain what this means.
2. State what the process of digestion does to the large molecules found in food.
3. Describe the movements which occur in the stomach. Explain what this means.
4. State two reasons why the stomach has such a low pH.

Figure 2: Drawing after Science Education Group, 2002, pp90-91.

These different layouts have different effects. Most immediately, this has *directional* implications: in the 1935 example, the writing makes reference to the image at the beginning and at the end of the opening paragraph of the alimentary canal'. In between, the reader will have had to turn the page. Less immediately it has effects on engagement for learning, encouraging different modes of reading, different modes of engagement. It says 'attend to this first and that after'. In other words, this layout does not facilitate a 'parallel reading' in the way layout does in the 2002 example. In the 2002 example, the layout steers the reader into a mode of a 'back-and-forth' movement. It is a mode of engagement of 'attend to these as equally significant; read them in mutual interaction'. In the example from the 1935, the layout steers the reader into a 'first-then'

mode of reading. In the 2002 example, the page on which chunks are laid out is itself part of a larger structure, that of the two-page-spread. Again, this stands in contrast to the 1935 textbooks, where text-as-writing was 'pushed' onto pages without much attention to how this played out spatially. What mattered was not where on the page a sign appeared, but where it was positioned in a sequence. The two-page spread is organized as a spatial unit, which is linked to a unit of time not present on the page, a 'lesson'; the chapter in the old textbook is organized as a unit of 'content'.

Looking sideways: a Japanese design

Figure 3 shows an example taken from a Japanese Science textbook published in 2006. The excerpt also deals with human digestion. It uses a range of modal resources to represent the absorption of food, involving the breaking down of food molecules as a result of the action of enzymes coming from organs located somewhere in the body. In the English textbook shown in Figure 2, the curricular material dealt with had led to two different accounts: *image* focused on spatial arrangement and an ordering of entities such as 'organs'. It was a 'physical' account, the physiology of digestion, showing material features such as 'size', 'shape', and 'links' between organs. The writing focused on processes, 'flowing' 'chewing', 'breaking down', 'absorbing'; and entities such as 'food chains', 'food webs'. It was a 'bio-chemical' account, detailing entities such as 'energy', 'complex organic chemicals', 'large complex molecules', 'fats', 'proteins', 'carbohydrates'.

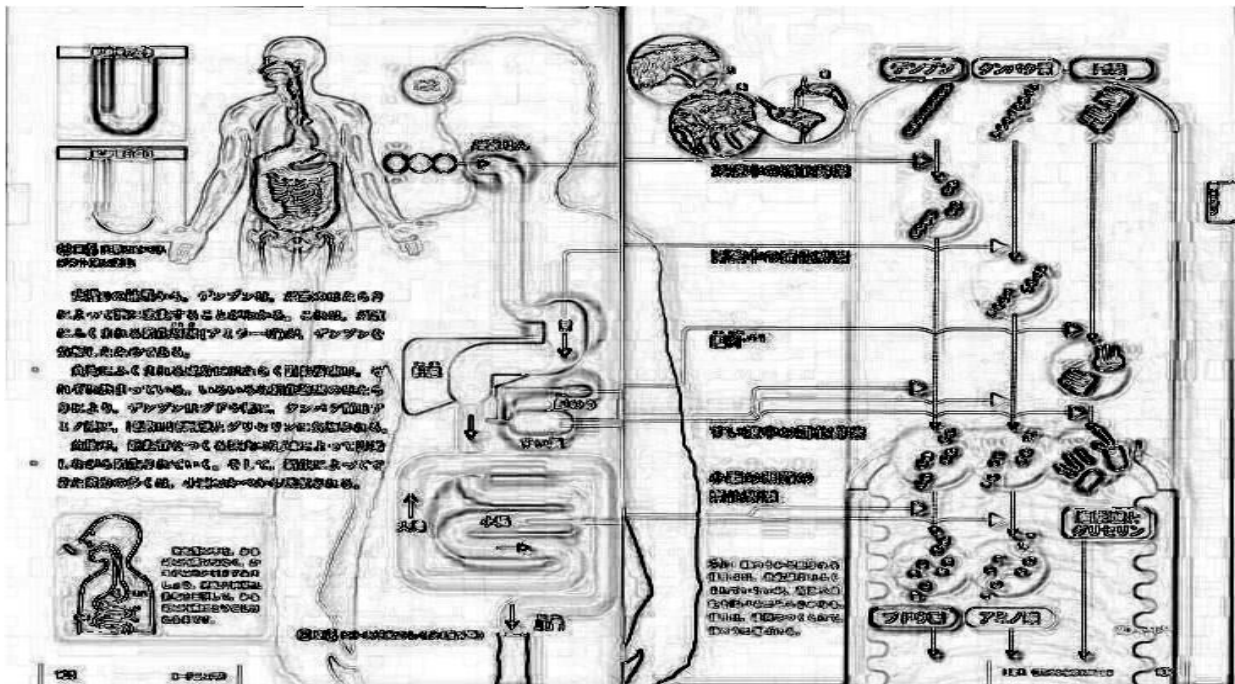


Figure 3: Drawing after Miura et al, 2006, pp106-107.

In the Japanese excerpt by contrast, *image* and *writing* are not separated out in that way. Image is literally 'all over' the page, visually dominating it. Image is used to convey both the physiological account and the bio-chemical one. Writing offers one route, a key to reading the visual parts of the text, but the visual text may also offer a key to reading the written part of the overall text. These texts may lead learners to attend and to engage differently and in this play a different role for different readers at different stages of the learning process. The overall text, in other words, offers inroads into an understanding of human digestion both via writing and via images. Students can choose for themselves which path to follow at which point in their encounter with this text and at different stages in the process of learning. When they first encounter the topic they might rely more heavily on the visual text; when they revise the topic for their exam they might then rely more heavily on the written account.

Two points need to be noted which do not appear readily by looking at the design of the contemporary English material alone. The first point is that it seemed that in designing the English textbook, writing was chosen for process-oriented content and that image was chosen for static, nominal entities and spatial relations or connections. It might seem that this follows an inherent potential, an affordance, in the two modes. The Japanese example clearly demonstrates that that is not the case. The second point is that these materials were designed in an entirely different society to that of the English book. We need to take our own principle seriously that design is the materialization of social givens. One thing we do know is that the semiotic and cultural resources, the semiotic histories, of Japanese society are different to those of English. For one thing - and this is a major factor - the script system(s) of Japanese are entirely different to the English, and much more visually oriented. This is bound to lead to a profoundly different attitude to the potentials of visual modes in Japanese design than in English.

While we have not encountered such a functional distribution of modes in English textbooks as in the Japanese example, we have seen distinctively different uses of image and writing in English information books. Here we have in mind, for instance, the books produced by Dorling & Kindersley. Unlike textbooks, information books do not construct a formal curriculum. Usually they are bought by parents, not teachers, though they are found in school libraries. Very similar multimodal designs are common in magazines for teenagers. Indeed the distinction of 'types of design' is becoming very blurry as we mentioned earlier: the boundaries between 'informal' and 'formal' social spaces are increasingly becoming blurred. The boundaries between the design of the English Science textbook and that of the English information book are a good case in point: the increasing approximation of design marks a rapidly increasing disintegration of the social domains of work and entertainment. It is interesting to speculate where the end point of this process will be.

Looking forward: a multimedia design

Design in education increasingly relies on the facilities of digital media. On the screen, *moving image* and *speech* can be used alongside or instead of *writing*. These modes afford a whole set of varied resources for the representation of school subjects. In other words, 'translations' and 'transductions' from one mode to another can now be made with relative ease; at relatively low 'cost' (Kress, 2003). The textbook may 'transduct' *artefacts* and *actions* into *writing* and *image*; on the web, *artefacts* and *actions* may be transduced into *moving image* and *speech*, as the screenshot below, Figure 4, shows. It is a still from an animation on rotational transformations. The 'scene' uses several modes - it *shows* through the use of *image*; it *tells* through *speech*; and it *describes* through *writing* - how to rotate an angle. Below the image of the protractor there is a written textual element; it is read out aloud - performed - so it is also present in the mode of speech. The text reads as follows.

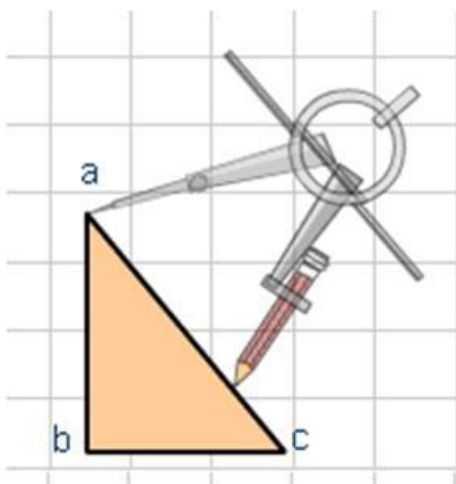


Figure 4: Screenshot from lgfl.skool.co.uk, retrieved 1 August 2007.

"Put pointer of compass on point 'a'. Open out compass to length of 'ac'. Draw a curve which passes through 'c'. This ensures that the length of the lines in the image will be the same as in the original triangle. This makes sure that the length of 'ac' (the image) is the same as 'ac' (the original) because the size of an object doesn't change during rotation".

Here there is transduction from *artefact* (the compass, the mode of 3D material entities) to *writing*, with effects similar to those discussed before. These affect the specificity and generality of the content, as well as having effects on ordering. The voice-over reading of the written 'script' uses *speech* for the transduction of the modes of *artefact* and *action*. The mode of *moving image* is used for the transduction of *action*. In this example, 'pitch as tone' is used to foreground particular lexical items; in the written text-element foregrounding is done by syntax.

Below is our transcript of the voice-over version; we have marked the boundaries between *intonation units* using a double slash, and we have underlined the items where the major pitch movement occurs (a 'fall' in each case). The element with the major pitch movement marks it as providing 'new information'. This creates a contrast of 'given' and 'new' information within each 'information unit' (cf. Halliday, 1967).

Put pointer of compass // on point a //. Open out // compass to length of a c //. Draw a curve // which passes through c //. This ensures // that the length of the lines in the image // will be the same as in the original triangle //. This makes sure // that the length of a c // the image // is the same as a c // the original //. Because the size // of an object // doesn't change during rotation //.

If we compare the written and the spoken text-elements, we see that the two modes provide distinctive readings and, with that, different potentials for learning, in each case. In the written segment, the first three sentences draw the reader's attention to the first-mentioned element – the *action* to be performed: *put*, *open out*, *draw* – and to the (imperative) mood, foregrounding *action* as *command*. In the spoken version, the listener's attention is drawn to *the object involved* – 'compass'; *location* – 'point a'; *extent* of action – 'out'; etc. What ensues is a contrapuntal organization, with the mode of *writing* highlighting action-as-commands – *put*, *open out*, *draw* – and the mode of *speech* highlighting *objects and attendant circumstances* – *location*, *shape*.

In this example there is also use of the mode of *moving image*, which combines the affordances of still image and its spatial organization with temporal organization: it unfolds in time. That brings distinct increases in semiotic resources and therefore in potentials for *design*. Elements can now appear and disappear, and through that, movement can be suggested. Above all, the viewer or reader's attention can be shaped. In the scene that we are looking at here, the first element to appear is the triangle. Then the compass appears, placed with its pointer at 'A'. Then two movements take place: the 'opening out' of the compass and the inscription of a curve. Then the compass disappears again. In this, the moving image represents the demonstration of how to use a compass rather differently from the written and spoken text-elements. For instance, it is *specific* about what 'opening out' and 'drawing a curve' entails. 'Drawing a curve' is displayed as a movement of the compass whereby one of its legs retains its position and the other leg, which leaves a trace, makes a gentle, clockwise turn.

The example shows that as a multiplicity of modes – *image*, *writing*, *speech* and *moving image* – become available, the potential for design alters radically. Resources with particular affordances become available for specific use; here, for instance, *lexis* or *depiction* bring implications for generality or specificity; syntactic resources have implications for variable *arrangements* of entities, as well as means for the expression of

the social relations of the maker of a message and its 'reader' – the relation of 'command' for instance. For the designer of the learning materials the question becomes one of 'aptness' of the resources for the specific occasion. There are implications for pedagogy: commands are given in the modes of *writing* and *speech*; in the mode of (*moving*) *image*, actors can be backgrounded; in the mode of (still) *image*, reading paths are established by the viewer or learner, while in *moving image*, reading paths are established by the designer. These design decisions concerning the use of modes are in effect materializations and 'ratifications' of pedagogic designs and they in turn are realizations of social organizations and arrangements. The design strongly sets the 'ground' for engagement and learning.

Young people's participation in design

Design is no longer exclusively the realm of professional textbook makers, as in the examples discussed so far, or of teachers alone. *Participation in design* now best describes the characteristics of communication, and not only in schools. That has profound effects on knowledge production. *Social* change has led to an emphasis on the agentive action of all participants in communication, even if differentially. Communication needs to be seen as a two stage process, with an *initiator/rhetor* producing a *message* as the 'ground' and an *interpreter*, on the basis of the 'ground', constructing a 'prompt' for interpretation, leading to the meaning which the *interpreter* takes from that message. It means that *design* takes place twice: at the point of the making of the message as the 'ground' and at the point of *interpreting* the 'prompt'. Young people act out of such understandings of their power in communication in *design* and knowledge production (Pahl, 1999; Stein, 2003). In other words, the social changes mentioned, have begun to manifest themselves in an assumption on the part of the young of their significant agency in the domain of their own cultural production. The production of *knowledge* is inseparable from the production of *signs-as-text*. Semiotic production is, at one and the same time, epistemological and ontological production. The question in each case is: whose agency is at work?

These social and representational changes are evident in contemporary media as well: the *participatory affordances* of current media technologies act to blur former distinctions of *production* and *consumption*, of *writing* and *reading*. The simultaneously global and local '*reach*' of media challenges the boundaries of communities global and local, with severe effects on *genres*; it mixes *contents* both global and local; *ubiquity* of access to information, *convergence* of media and *connectivity* in the sphere of individual lives entails that occasions of and resources for knowledge production and creativity are not tied to particular sites and times. *Multimodality*, representations in many modes, allows and demands the choice of apt communicational resources in all situations.

The newer individual dispositions toward agency have deep effects on design processes. All aspects of the domain of meaning are drawn into the new social givens, with far-reaching effects. In relation to the making of texts, for instance, questions of 'authenticity' and authorship have changed profoundly. In *downloading*, '*mixing*', *cutting and pasting*, '*sampling*', *re-contextualization*, questions such as "where did this come from?" "Who is the original/originating author?" seem not the issue. Much like the use, in former times, of a ruined church or monastic building as a quarry, as a source of building materials – a large stone here as a lintel, another there as part of a wall - texts are taken as 'resources' to be 'mined' for the making of new texts. There is an absolute need to understand the practices, epistemologies, aesthetics and ethics of contemporary forms of text *design*. At the moment these are discussed in terms of 19th century models, with terms such as 'plagiarism' or 'mere copying' often too readily to hand: that is, the invocation of models from an era where conceptions of authorship were clear and legally buttressed. The notion of *design* and an elaboration of *principles of design* can give, instead, a relevant means of describing and analysing current *principles of text-making* underlying these practices by certain, generationally defined, groups.

At the moment the school is caught between traditional and contemporary conceptions of authority and agency in relation to production of knowledge, to the authoring of texts, the authority/canonicity of knowledge, and of semiotic forms much more generally. Political authority is contradictory: a demand for the new, for innovation and creativity, countered by anxieties around loss of control. But learning has long since left the confines of institutions such as school, university, and college, and forms of pedagogy have to accommodate to 'life-long', life-wide' learning, that is, learning at *all times*, by those who demand that their interests be taken with utmost seriousness, in *all sites*, in *all phases* of professional and personal life. In school, many young people see themselves as authors of the knowledge they want and need, authors of the kinds of texts that meet their social, personal and affective needs – even though authored by processes which bring them into conflict with authority which is focused traditionally. In that they come into conflict with the sharply differing and contradictory conceptions and practices of the school. Conceptions of pedagogy held by 'the school' as institution are at loggerheads with those held – however implicitly – by those in school. In that stand-off, conceptions of pedagogy will need to be developed which accommodate the conflicting interests of generation, of power, of politics, and of a market-dominated economy. Clearly, the agency of learners has to be taken seriously and placed at the centre of pedagogic attention. Equally clearly, the insights, understandings, values, knowledges which are the results of centuries, even millennia, of social and cultural work cannot and should not suddenly be ditched.

Shaping the future of education

Three factors need to be held in mind in speculating about trends in design: agency and distributions of and claims to agency, the multiplicity of resources for making meaning available as resources for design, and the deep social and cultural diversity of contemporary societies. All three have social and semiotic aspects, that is, they bring social political and semiotic consequences.

Pedagogically, the agency and the centrality of learners as *designers* of texts and as *designers* and makers of their meanings, has to be the starting point of all considerations in education. It is unlikely that the claim by learners to agency in the processes of learning will abate over the next decade or so. This has consequences for institutional responses to such claims, and to a new conceptualization of the role of institutions in that process. We have made one suggestion, namely that an institution's task can be the design of environments for learning and the shaping of the curricular 'ground' for the learners' engagement.

Semiotically, *text making* will increasingly be, at all times, *multimodally designed*, arising from the specific *interests* of rhetor and *interpreter*. In such designs the affordances of all modes are judged and used in relation to that interest. The multiplicity of modal resources for imagining and implementing design link both with the agency of designers, both in the role of initiators and designers of messages and in the role of designers as interpreters of these messages. In political agendas focused on innovation and creativity, *design* as a prospective and therefore always necessarily innovative and transformative process will need to come more and more into the foreground of pedagogic attention.

The tasks of understanding the new givens of representation, communication, innovation and creativity lie with researchers and policy makers and the designers of pedagogies and curricula. That is, several institutions will need to be involved and aware of their respective competences and responsibilities. The claim and assumption of agency in design by learners of all kinds poses a profound challenge in terms of developing theories and practical means for understanding multimodal design. This is both in terms of means for valuing learners' interests and meanings and in terms of criteria for evaluating meanings realized as multimodal 'semiotic objects'. In other words, theories of learning will need to refocus their metrics of value, evaluation, and assessment from

criteria derived from authority and power to criteria oriented to understanding the principles applied in the learners' design.

Captions

Figure 1: Excerpt from Fairbrother, Nightingale and Wyeth, 1935, pp161-162.

Figure 2: Drawing after Science Education Group, 2002, pp90-91.

Figure 3: Drawing after Miura et al, 2006, pp106-107.

Figure 4: Screenshot from lgfl.skooool.co.uk, retrieved 1 August 2007.

Bibliography

- Bezemer, J. and Kress, G. (2008) Writing in multimodal texts: a social semiotic account of designs for learning. *Written Communication*, 25 (2), pp166-195 (Special Issue on Writing and New Media).
- Bezemer, J. and Kress, G. (in press) Visualizing English: A Social Semiotic History of a School Subject. *Visual Communication*. Special Issue on Information Environments.
- Brindle, K., Machin, R. and Thomas, P. (2002) *Folens GCSE English for AQA/A*. Dunstable, Folens.
- Fairbrother, F., Nightingale, E. and Wyeth, F.J. (1935) *General Science*. Part III. London, G. Bell and Sons.
- Jewitt, C. (2008) *Technology, Literacy, Learning: A Multimodal Approach*. London, Routledge.
- Kress, G. (2003) *Literacy in the new media age*. London, Routledge.
- Miura, N. et al (2006) *New Science: Field 2*, Volume 1 [Atarashii Kagaku 2 Bunya Jou]. Tokyo, Shoseki.
- Pahl, K. (1999) *Transformations: Children's Meaning Making in Nursery Education*. Stoke on Trent, Trentham Books.
- Science Education Group (2002) *Salters GCSE Science Y11*. Oxford, Heinemann.
- Stein, P. (2003) *The Olifantsvlei fresh stories project*. In: Jewitt, C. and Kress, G. (eds.) *Multimodal Literacy*. New York, Peter Lang, pp123-138.

Acknowledgements

This article draws on an ongoing research project, 'Gains and Losses: Changes in Representation, Knowledge and Pedagogy in Learning Resources' (2007-2009), funded by the Economic and Social Research Council (RES-062-23-0224).

About the authors

Professor Gunther Kress
Institute of Education
Centre for Multimodal Research
20 Bedford Way
London WC1H 0AL
United Kingdom
phone: +44 20 7612 6502
fax +44 20 7612 6177
email g.kress@ioe.ac.uk

Dr Jeff Bezemer
Institute of Education
Centre for Multimodal Research
20 Bedford Way
London WC1H 0AL
United Kingdom
phone: +44 20 7612 6705
fax +44 20 7612 6177
email j.bezemer@ioe.ac.uk

Gunther Kress is Professor of Semiotics and Education at the Institute of Education, University of London. He is interested in questions of meaning and its semiotic realizations in interrelation with social and cultural organization. In his professional location, his focus is on learning and on the material shape of curricula and forms of pedagogy in a globalizing world. Among his recent books are *Multimodal Discourse, Before Writing: Rethinking Paths to Literacy, Literacy in the New Media Age, and Reading Images: The Grammar of Visual Design*.

Jeff Bezemer received his Master's degree in Studies in Language and Culture and his PhD in Education from Tilburg University, Netherlands. He is Research Officer at the Institute of Education, Centre for Multimodal Research. His research is focused on representation and communication in educational settings. Recent publications, including articles in *Written Communication* and *Linguistics and Education*, also deal with multilingualism in immigrant settings.

This document has been commissioned as part of the UK Department for Children, Schools and Families' Beyond Current Horizons project, led by Futurelab. The views expressed do not represent the policy of any Government or organisation.