

In Search of Post-Typographical Educational Ideals

By Michael Giesecke¹

Abstract: Cultural change is the emergent product of conservatory, reformatory and revolutionary processes that destroy old structures. The attempt to destroy the ideals of the culture of the book by means of E-Learning and to optimize existing structures through digitalization and the implementation of networks seems inevitable, however it distracts from the real potential of the new media. What we need is a fundamentally new understanding of communication, knowledge, and information processing. Post-typographic educational ideals relativize the regard for homogeneity and equalization in favor of heterogeneity and the integration of parallel processes. They relativize the importance of mechanized communication media and of communication with little feedback, and they steer attention towards the bodily media and dialogue forms of communication. Furthermore, they strengthen self-reflexive information processing and enhance triadic thinking.

1

Knowledge is culturally sanctioned information

Teaching and learning are generic terms for those processes that reproduce human cultures. Social systems remain preserved by copying forms of perception, behavior, networks, knowledge, tools, and other cultural achievements. Without inheriting information and programs, society and its sub-systems such as, e.g., groups of people and social classes as elements of culture, cannot be preserved.

In addition to all objects of a civilized society, – machines, cultivated plants, gardens, road and activities – the necessary programs for their application, use, and implementation have to be generated in the psychological and social systems as well. The reproduction of the arsenal of external material is not enough. When environmental conditions and/or internal societal structures change, clinging to the proven stock of knowledge reduces the chances of survival of subsequent generations. They will be burdened with dysfunctional knowledge. In such a situation, educational institutions that seek to preserve their systems by copying run a risk. The general task of politics and of humanistic scholars is to strike a balance between reproductive, reforming, and destructive processes in the management of knowledge, which must be adjusted to the requirements of the next generation. This is done, among other things, by changing the assessment criteria of information and programs. All

¹ Translated by Otto Peters

information that is considered to be suitable for passing on assumes a special status. In modern industrialized societies this type of information is called knowledge.

Conclusion: Knowledge is a special case of information that stands out due to the fact that it was declared important for the reproduction of a cultural community and was made the content of organized teaching and learning. It is clear that far-reaching social and technological changes must also change the criteria for knowledge and the order of priority of the multifarious types of information. Otherwise the existence of this culture is at stake.

2

The co-evolution of knowledge, information processing and media

Teaching and learning are phases in the cycle of information processing, a module of knowledge management. Only such information can be taught that was perceived with one or more of the senses and stored adequately. All learners take their information from information media that are more or less technologically based. If the ways in which they are perceived change, we will gather different types of information, and sooner or later the manner of presenting media and the ways in which information is passed on will change as well. Irrespective of the change of the information processing cycle that we enter, no phase of the whole information cycle remains unaffected: New media provoke backlashes to the manners of perception, new manners of perception provoke alternative forms of presentation, etc. The following chart shows the circular dependencies of innovations in information processing.²

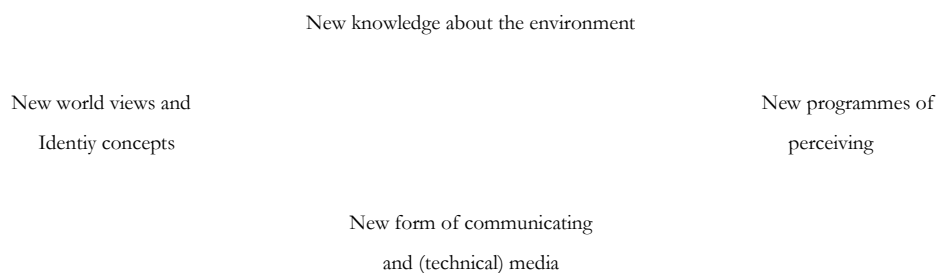


Table 1: Circulation of information processing: New technical media have retrospective effects on the ways of perception, new ways of perception provoke alternative forms of presentation.

² For a full explanation and the empirical verification exemplified by the discovery of the 'New World' by Christopher Columbus, cf. Giesecke (2002, p. 109)

It should not be taken for granted that there is a correlation between perceiving and information processing on the one hand, and technical media on the other, and that this correlation is recognized and regarded as being important. Before the appearance of technical media, people were unconcerned for a long time about the medium that is used for creating and presenting knowledge. Knowledge, especially scientific knowledge, was not adhered to media. Knowledge was – and probably still is – considered “pure”, that is independent of media for perception, storage, and dissemination.

In 1926, A. C. Klebs and K. Sudhof, a book historian and a medical historian respectively, were certain when they wrote: “No one will maintain that it is relevant whether a thought is printed or written and that the history of humanities is influenced by the method of its being recorded” (Klebs 1926, 16). However, historical retrospection shows that the lack of sensibility for the bonds of all types of information to media was only an intermediate phase. In Germany this phase lasted from the middle of the 19th century for about 150 years, and during this period naturally in a qualified sense only.

To the great thinkers of the 16th century it was (still) perfectly clear that the new forms of cognition that they were practising depended on printed books and their free and market-based distribution. The new scholarship was based on methods that required visualizing, symbolizing, and public circulation by the typographical medium. Occult and secret knowledge was denied the attribute “(true) knowledge”. Only during the 19th century did special media and information processing programs, which were used for generating knowledge, became so self-evident, so natural that they were no longer borne in mind.

Conclusion: Our concepts of ‘knowledge’ and ‘learning’ emerged in co-evolution with media in which our culture has stored and circulated its knowledge. They are the results of the self-description of the circulation of cultural information. And this self-description must necessarily be selective. The criteria for this selection reflect cultural value standards.

3

The necessity of post-typographic concepts of knowledge

If the co-evolution idea applies, information that is valued and recognized as ‘knowledge’ by the post-Gutenberg culture will *differ* from the knowledge of the past five hundred years. The concepts of teaching and learning will be changing as well. The actual discussion about the use of electronic media in teaching and learning misjudges these contiguities when it continues to operate with concepts of knowledge and learning that were developed by the culture of

the book in order to become aware of its identity.³ In the future, the ‘learning’ that is called ‘E-Learning’ might differ no less sharply from the learning concept of the culture of the book as the latter differed from the pre-modern concept that was condensed, for example, in the Middle High German word “leren”. There is not much sense in digitizing the educational programs of the 20th century, to electrify the media or to maintain the criteria for successful learning by national educational institutions. *Post-typographical educational policy needs post-typographical concepts of knowledge, ways of generating knowledge and of communication. It will not be possible to justify these concepts exclusively on a scientific basis. In the final consequence they will be based on value judgements. It is necessary to discuss the problem which forms of information, perception, presentation, and dissemination do we intend to approve and authorize.*

After the general approval and appreciation of craftsmanship and ‘craft’ in pre-modern times and of ‘true knowledge’ in the culture of the book and of industry, the question arises how to accept und appreciate alternative forms of information and information processing that use the resources of old and new media in a balanced way. When searching for them, it may be helpful to ascertain first which central ideas about knowledge, scholarship, communication, media, acting and experience were dominant in the culture of the typographical book. Becoming aware of the historically relative character of these central ideas may make the processes of disengagement easier.

4

Homogeneity as a model for communication and education in the culture of the typographical book

Industrial culture implied that only an adequate common stock of knowledge can ensure cultural communication. This common ground is reached by the standardization of codes and programs and by relying on canons of knowledge. Important media of standardization are textbooks. Standardized languages and common fields of knowledge guarantee mutual communication. Under the conditions of typographic mass communication this was a plausible and successful strategy. The model of communication behind this strategy is: Communication is successful when the communicators process information about their environment in parallel ways. This can be achieved (a) when they use the same perception and processing programs (software), and (b) when they experience themselves typically as information processing systems with

³ Very few authors dealing with the development of E-Learning and/or reflecting on this form of education go so far as to call also their concepts of learning and knowledge into question. They construct their practice and their models against a background of typographical concepts of communication, information media, and information processing.

identical perception and processing organs (hardware). The main concern is to minimize the difference between software and hardware.

Both of them are practised at schools and universities. This communication model has the advantage that it still works when feedback between the communicators is not possible, and when they do not experience the same environment at the same time. Its strength is that it enables identical reproduction of the same field of knowledge in a society. Its weakness is the conformity of the communicators' manner of experience and processing, as well as the devaluation of heterogeneous processes and multimedia and non-verbal communication.

Under these conditions, the typographical medium 'book' performs the following main functions:

- It is an informative environment for the single learner and his or her culture, especially as it duplicates the natural and technical environment symbolically. An autopsy is therefore partially superfluous. It brings about a simplified standardized environment.⁴
- It replaces interpersonal interaction, the face-to-face cross-linking of communicators. The book functions as a substitute for the dialogue with a teacher. It enables learning by reduced interaction.
- It represents programs that tell us how people and cultures should perceive, think and act – and how not. They provide epistemologies.

All strategies that use new media for optimizing the identical reproduction of knowledge according to the standards of societies are only of marginally interest for me. This is unavoidable and does not imply 'visionary' implications.

5

Absolute media dominance is a characteristic feature of the culture of the book

A principal question of actual media policy is whether our culture should continue putting emphasis on the hierarchical order of media in the future, or whether other forms for developing the relationships between media and the senses should be developed. "The 'either-or' way of thinking that orients itself to a central dominant medium perpetuates a standardized cultural theory according to which cultures are conceived as homogeneous complexes and product of unified communication habits that are enabled and even determined by the absolute dominance of one medium" (Sandbothe 2003, 266). After centuries of the culture of the book, the celebration of a single medium, be it books or the television screens, does not show any visionary thinking. 'Digital culture' instead of the 'culture of the book' – this would be

⁴ The world of books is naturally also a synthetic, artificially created world in the same way as the worlds that we observe on the computer. However, other virtual strategies are used, here.

nothing new seen from the point of view of cultural history, but only more of the same.

Our main concern is to break the compulsion of reiteration and to prevent a single medium from being considered as the main desired medium, even if it is such a complex one as computers and the Internet. E-Learning is one important option among many. For many purposes it is obligatory, but principally it should be considered a node in a multi media network. Developing the electronic medium in isolation means to hang on to the ideal of the dominant medium of the industrial age.

Conclusion: *The vision cannot be based on a single medium, but only on the ecologically co-functioning of many different media.*

6

Limitations of ecological orientation and the paradigmatic role of group discussions

The labelling of our epoch as *multimedial also* needs further comments. All human cultures are multimedial. The bone of contention was always the relation between the media. The thinking that was oriented to a central medium relies on a rigid hierarchy. The question arises whether there may also be additional forms and what they would look like.

At the moment, we are still far away from being able to determine how alternative relationships between the media could be developed. One vision could be the model of ecology, which is already used intensively. What matters is to generate knowledge in an ecological network of different media and types of perceiving, processing, and presenting information. Likewise, it is important to find an ecological niche in which new media can best develop their potentials for generating knowledge. The orientation to mass communication with little feedback and isolated recipients, and the confidence in a single or at best two transmission media, make it difficult to see the resources of the new media. However, group discussion is much more suitable as a paradigm for the development of adequate electronic media communication (cf. Giesecke 2002, 409). Here the roles oscillate; the chief concern is to achieve a balance between the contributions of the participants and the changing focuses of the themes. The orientation to mass communication with little feedback, isolated recipients and the confidence in a single or at best two transmission media makes it difficult to realize the resources of the new media. Rather, group discussion could be used as a paradigm for developing adequate electronic media communication (Giesecke 2002, p. 409). Here the roles oscillate, it is about a balance between the contributions of the participants and the changing focuses of the themes. Orientation towards the multimedia face-to-face discussion facilitates the adoption of the ecological vision of the interplay between media

of different species. Technical media with little or no interaction have had long enough preference in cultural information processing.

If, in addition, the idea of balancing is taken as a starting point, we can see from the outset that the niche can be occupied only at the cost of the media used so far for forms of generating and transmitting knowledge. At present, the implementation of the new media seems to be taking place at the cost of the book, and also of face-to-face instruction. E-Learning is replacing both the textbook and the classroom.

The argument of media theorists that people and cultures function as ecological systems does not provide guidelines for political activities. It increases our understanding of these phenomena. It tells us that we will have to deal principally with massive parallel processing, synaesthesia, multimedia, and different systems. This means that we have to manage the interrelation of the senses, forms of processing, and presenting experiences as well as a diversity of communication forms. It provides for a concept that enables a deeper anamnesis and diagnosis. But it says little about the direction of interventions. Actually, it applies only to the maxim: "Intervene in such a way that a balance between the reluctant elements can be maintained!" It is clear that educational policy cannot restrict itself to maintaining the system. Innovation cannot be obtained without deconstructing the ecological system to a particular one of its sub-systems. If nothing else, this was recalled by the last PISA report. Never again will Germany achieve the literacy rate and literacy quality of the 20th century – unless the decision is made to ban the new technical media, very much so as Japan did in the seventeenth century with regard to printing and the use of firearms.

Which media will survive and which ones will be destroyed remains a value judgement. But we cannot reap the benefits of the new media and at the same time still be attached to the unmodified typographical educational ideal. Considering the PISA report from the standpoint of post-typographical culture, we can draw the conclusion that Germany has made more progress in departing from the typographical and industrial culture than other nations.

Naturally opposition to such considerations and changes is possible anyway. It can be argued that at present no principal change is becoming apparent in our cultural information processing. Consequently, it does not make sense to speak of a 'post-typographical culture'. Or, the innovations can be seen, but rejected and combatted - as happened to Neil Postman (1983) almost thirty years ago. If this is the case, we would be wise to keep away from using new media at schools and universities.

However, both positions cannot be kept up under the conditions of globalization.

Actual changes in generating and communicating knowledge

It makes sense to speak of a post-typographical culture, because fundamental changes in the cultural processing of information do exist. It is not possible to provide in connection with this systematic evidence in an essay like this (cf. Giesecke 1991, 1998, 2002). Nevertheless, it is possible to point to some relevant changes that can be identified by communication and media researchers when looking at cultural science subjects at schools and universities during the last few years. The following table summarizes them. After that some trends will be considered more closely.

Table 1: Typographical and post-typographical forms of generating knowledge

| | |
|---|--|
| Typographical scientific ideal | Counter movement during the last decades |
| Social organization: hierarchic institution, linear organisation | Project groups, interdisciplinary networks |
| Homogeneous discipline, regulated by axioms, relying on scientific principles, public educational programmes | Plurality of theories and methods, description of the singular, specific phenomenon |
| Quality criteria: true:false. Falsification | Knowledge that is successful in a given project, adequate, pragmatic, functional, tolerant of faults |
| New knowledge emerges as sum of individual processing of perceptions and of informational performances | New knowledge emerges as result of net-based projects (from individual learning to learning organisation, and group) |
| Progress is the result of accumulation, technization, standardization | Progress is the result of synergy, networking, globalization |
| Preference for visual data, visual forms of presentation as well as for linguistic codes (professional jargon) and standardized symbolic presentation | Multi-sensory surveys, multi-media presentation of knowledge, avoiding exclusively semantic classification |
| Linear presentation and coherence | Hypertexts (in print media as well), multidimensional data banks |
| Thinking in binary oppositions (either-or), classical bivalent logic (tertium no datur) | Fragmented thinking (as well as), introduction of intuition, emotional intelligence |
| Learning ahead, accumulation of knowledge; teaching as instruction (requires knowledge of results in advance) | Learning during and after practice, learning as unlearning of principal assumptions, of dogma |
| Lecturers and teachers as experts in scientific disciplines (lawgiver and teacher) | Approximation to (self-reflexive) counselling, teachers as moderators, at least in graduate studies |

The pushing back of book-based learning in favour of E-Learning at Universities

At present a compromise will be reached between the old and new paradigms at universities, as they are establishing a two-phased teaching and study organization: On the one hand electronically perfected dissemination of universally applicable true knowledge in advance by class teaching and standardized calling up of content by means of tests in Bachelor's courses. On the other hand, project learning with contacts to practice and highly self-reflective parts in Master's courses, and even more so in postgraduate and research studies. Experiences with three age-groups of B.A. students in Erfurt who completed their studies show that Internet inquiry pushed reading of typographical media clearly into the background. Knowledge that is *not* available in electronic form will become a learning deluxe that is to be exercised with caution by the majority of students, especially by B.A. students. Those who want to make sure they get good grades cannot afford to waste time by long-drawn out reading on account of their tight schedule. Short papers, which are compilations of abstracts, copied from the Internet, provide the best 'value for money' in the eyes of those involved.

When typesetting and categorizing E-Learning, specialized literature tends to lose sight of the fundamental fact that E-Learning takes place whenever persons are confronted with electronic media, naturally with the Internet first of all. Insofar E-Learning takes place on a massive scale and irreversibly, no matter which priorities are set by the national educational policy, and which values will prevail in corresponding discussions. Many of those involved in this discussion overrate the influence that school and university can exercise over the management of cultural knowledge. E-Learning is a concept that is parallel to book-based learning. We cannot expect that the possibilities for using electronic media for learning are less strong than for using printed texts.

Most of the pedagogical concepts that, overlaid with English terms, are used to characterize the "new" learning are not so new. Since printing prevailed there have been practically no educational institutions in which 'blended learning' was not practised as isolated book-based learning, face-to-face teaching by experts, and self-organized group work alternating. Likewise 'coaching', correction, control of assignments by teachers, parents and co-workers are not achievements of the last twenty years. Hybrid learning settings have belonged from time immemorial to the credo of the West, and certainly since the spiritual exercises of the Jesuits and the 'Orbis Pictus' of Comenius.

In terms of an ecological consideration it is advisable to keep *all* forms of information processing and communication in sight, and not to focus our attention on technical media in a one-sided way. If the rule formulated earlier is applied, we will gain the insight that has up to now scarcely been perceived that

profound changes by no means took place in technical information processing only.⁵

9

Individual and collective self-reflection as a misjudged innovative achievement of the 20th century

In the culture of the book and of industry mechanization and standardising were regarded as main instruments of progress – not just in the sciences, but in culture anyway. This is partly a myth, as non-technical forms of social information processing as well have always improved our knowledge. Innovations that were neither based on mechanization nor on standardization were, e.g., the introduction of forms of collective self-reflection in therapy and group dynamics in the 20th century. Sigmund Freud, Kurt Levin and Jacob Levi Moreno were pre-eminent in this new field. The latter two described the emergence of an absolutely new level of social phenomena. They laid the foundation for using groups as sensors and evaluation instruments for collectively generated knowledge (sociometry, action research). None of the three relied on technology or methods of dissociated observation with little feedback, but concentrated on face-to-face communication, dialogues of two persons or in groups.

Generally, in the post-typographic society the relevance of self-reflective forms of individual and particularly collective learning increases at the expense of imparting knowledge about our environment. When developing the post-typographical information society, we no longer wish to tread beaten tracks in our innovation strategies. We should not turn towards technization and standardization in a one-sided way. It is true standardization was the ideal solution for industrialization, but now new opportunities are emerging.

10

Diversification of the persons involved in teaching and learning

Presently, a fundamental change is taking place with regard to the description of teachers and learners. In the culture of the book and industry these have been undisputedly individuals. A single individual acts as teacher or student and is in the center of attention in the theory of education and in educational policy. Ever since the discovery of the individual in Renaissance, symbolized, e.g., by Gianfresco Pico della Mirandola's 'oratio de hominis dignitate', which is often associated in the same breath with the discovery of the author and the individual reader, the reproduction of cultural knowledge has taken place in

⁵ This is a description of a situation in the next development phase. How we judge it is a completely different matter.

schools and institutions of higher education as an interchange between single individuals. Society appears as a sum of individuals, even a long time after the alternative concepts of Marx and other critics of society of the 19th and 20th century. In spite of all the different details, educational theories are based on the assumption that culture emerges as the sum of individual citizens. Consequently, all forms of instruction were oriented towards the individual in the singular and not towards groups or institutions. Pedagogy uses psychological knowledge, but the individual person is tested or examined, and not the group taught.

This settled conviction has now been shaken. Not only educational experts of the European Union speak of 'learning societies' (cf. Giesecke 2002, chapter 8/9), and the new schools of management of 'learning organizations' (Senge 1996). In many sections of our society the view prevails that meta-individual social systems can be and must be subject and object of instruction in future. How teaching and learning by or of such social systems, which resist being split up into individuals, can be organized is not yet clear, as theories and, to a great extent, relevant experience as well, are lacking. The conditions for the leaning of social systems seem to differ from those of the individual. This can be demonstrated by pointing to the moderation techniques that have been developed especially for learning in groups (1989/1994; Maleh 2000; Owen 2001a, b). Electronic media supply another example.

Conclusion: Post-typographical culture qualifies the relevance of individuals as teachers and learners in favor of organizations, groups, and teams.

11

Preserving and innovating programs of the new media

The dependence of media policy on the typographical culture of the book is paralleled on the level of programs that have so far been developed for electronic media. For instance, Photo Shop and other pixel-oriented picture editing and producing programs are based on the glass plate ideal of perspective that was developed in the Italian Renaissance. The pointwise scanning of the environment by a visual beam, which is perceived as visual perception, was taken as a basis for the development of television and television cameras. Vector-oriented image programs (e.g. Coral Draw) include the method of the central perspective, which is based on Euclidian geometry. As regards Photo Shop, there is also the fact that principles of setting up pictures layer-wise (also transparently) have been perfectly applied, in the same way as in oil painting, and there only at first, since the 15th century. Working with empty spaces and with the accentuation of outlines required the method of perspective projection; brushes imitate the styles; clear and dark and

contrast graduation enabled the use of insights into colour and blurring techniques. Seen from this point of view, Photo Shop can be understood as a form of ‘master modeling’, as it reconstructs expert programs of an older epoch!

The constitutive basic idea for the new media, perceiving movement as a sequence of still pictures, also has a long history (cf. Berns 2000). Tomb-paintings and picture propaganda engraved in stone show that this idea was already realized in the Old Empire of Egypt, although not very consistently. Trajan's Column in Rome, which dates from the period of the Roman Empire, is another example. Since the early stages of the modern age, this principle has been systematized and applied in descriptions on woodcuts and copperplates. For more than two hundred years, the technical application of this principle has been processed in films. Neither ‘Premiere’ nor ‘Flash’ could be produced without timelines and the sequential process model. And they do not need another epistemology.

In short: The visualization of the new media is still in the phase of dependence on older media, at least with regard to its basic ideas.

Breaking new ground takes often place as deconstruction, as negative dissociation from traditional patterns. This could be observed in video art, which broke consistently with the principles of creating illusions of rooms that were fundamental for the classical film. They are based on modern perspective concepts of the creation of rooms. The observer/the objective of the camera leaves the external point of view and becomes part of the *mise en scène*. Increasing the sequences of cuts in video clips is also a form of falling back on the programs of older media. On the other hand, there are also obvious patterns that cannot be interpreted as repetition and/or destruction of existing structures (cf. Dinkla 1997, Heibach 2004), especially in the area of art in the electronic room.

With regard to future experiments the following three statements can be made:

1. Innovations have typically been successful when they were developed in a synaesthetic and multimedia way.
2. Innovations have been successful when it is not the single person/observer that applies the epistemological paradigm, but the social group or team. Whatever is to be achieved, it will no longer be the product of a single subject creating understanding, but of the dialogue of several persons. However, the epistemology for arriving at and presenting knowledge in groups or teams is still missing.
3. A successful approach for departing from old strategies of visualizing seems to be the consistent use of parallel forms of perceiving and presenting, i.e. to abandon one-sided linear or sequentially organized visualising. The single ‘picture’ does not need to carry meaning any longer. Rather it emerges only by being networked with other pictures. This takes time and compels the observer to leave his or her fixed focal point in favour of a floating movement.

The cooperation and interplay of varying components is an innovation of these digitized approaches. In electronic media, these components are not brought together by rigid linearity and firm sequences of steps. The innovation is the ability to oscillate and to focus different styles on a trial basis every time (cf. also Heibach 2002, p. 270). It is exactly the acceleration of oscillation, for instance in form of cuts in video clips, and the combination of pixel oriented pictures of the environment (photo realism) with vector oriented and rendered constructions in cinema films (e.g. The Lord of the Rings II), that leads to a phenomenon of a specific quality.

Conclusion: Innovation emerges from the oscillation and fast change of programs.

12

Scientific and new thinking

The dominant self-description of the sciences is based on prevailing historical conditions, which have changed dramatically during the last decades. The still dominant concept of modern science is genetically and functionally tied together to typographical media and to market-economy forms of networking with little feedback. In particular with persons who are sensitized to media technology it must appear entirely improbable that this concept will remain unchanged under the new medial conditions. Criteria such as the universal applicability of its statements (at all places, always, for everyone) – an ideal of typographical networking – or the demand that data and results are to be presented in visually perceptible media, and the demand that redundancies be avoided, make no sense in electronic media and global nets. (Giesecke 1991, p. 397; on the ideal of independence from rooms, persons, and time p. 382).

“(Electronic) media force philosophers to adopt a new style” said Hartmann (2003, p. 142). “The new media culture requires a new thinking” (ibid) – and this applies not only to philosophers, or to a few academic disciplines, but also to everyday life. The project ‘cultural science’, which claims to have the function of moderating beyond the single discipline as well, can be grasped as a reaction to the requirements of the information society in the 21st century (cf. Dillo et al 1998). In the final consequence it aims at a transdisciplinary knowledge network. Here, the favoured traditional homogenous disciplines, which strove for general validity of their results, will have a proper place, in the same way as the case studies in the tradition of idiographic hermeneutic historical research that is organized in project form.

The ideal of the leading medium corresponds to the ideal of the single one true form of creating knowledge – in the typographic culture the homogeneous consistent nomothetic science. Physics as a homogeneous and, at least in the beginning, consistent discipline based on axioms can be regarded as the leading

discipline. Other disciplines emulate this ideal in their experiments and the formulation of results.

By favouring coherence and consistency and by disciplinary division of labor, sciences so far are more likely to confirm thinking in either-or terms and fragmentation. Discovering confusion, risks, and fragmentation in organizations and in society does not offer perspectives. The demand for systemic multi-perspective descriptions are steps in the right direction, but in this unspecific form end up in arbitrariness that neither provides guidance for practitioners nor access to specific follow-up studies for scholars. Neo-liberalism can be justified in its thinking and economics as a temporary counter-movement against dirigisme and rigid structures. However, it does not provide a long-term perspective for complex systems. As soon as viable programs or theories have emerged, they must be protected. Only a stabilization that does not correspond to reality creates institutions and the axioms as well that then make a difference between singular scientific projects and scientific disciplines.

Conclusion: Favoring (objective) truths that are independent of time, persons, and locations, and that have made sense in the culture of the book, is reduced in favor of functionally adequate information that is, so to speak, pragmatic knowledge oriented to themes, persons and/or professions. The area of applicability can be reduced. Universal validity is no longer aimed at. The adequate form for storing and communicating these molecules of knowledge is multi-dimensional data banks (Giesecke & Feske 2004; www.kommunikative-schlüsselqualifikationen.de). They must be developed in such a way that, on the one hand, they do not reproduce the linear structure of typographical memory bank, and, on the other, do not double the over-complexity of the world by means of electronical symbols.

13

Triadic thinking

In the present phase of development forms of thinking and controlling are required that are neither based exclusively on homogeneous concepts and binary logic, nor on concepts that glorify over-complexity and 'laissez-faire'. Models are needed that represent the contradictory complexity of cultural and communicative phenomena, without reproducing the inconsistent complexity of the phenomena. This is only possible by reducing the dimensions of perception, thinking, and presenting, including denoting them and presenting the criteria of selection to the communicator.

In that case the decision is initially focussed on the question of how many factors and dimensions should form the basis of generating and storing knowledge. The answer inherent in this paper is: take neither the binary concept as a starting point nor n-dimensional concepts, but triadic concepts.

While so far in the sciences the complexity of phenomena has been reduced according to the either-or principle, the achievement of triadic thinking lies in the fact that great, and above all, contradictory complexity as well, of phenomena that are not homogeneous, simultaneous processes and multimedia relations can be preserved longer in thinking and communicating. The phenomena are understood as a product of the interaction of three elements – no more and no less. For instance, ‘communication’ appears to be the interaction of ‘information processing’, ‘networking of the communicators’, and ‘reflection between media’ (cf. Giesecke 2002, p. 20); www.kommunikative-welt.de, Matrix Theorie Modul ‘Kommunikation’).

When intending to develop the vision of synesthetic understanding and multimedial communication, we will need multi-dimensional concepts, which enable descriptions of concurrent processes, which belong to different species and interact between each other. Instead of binary schematizing, multi-dimensional thinking and the ability of oscillating should be fostered.

The concept of change applied in this essay is also triadic. Cultural change is the emergent product of preserving, reforming, and revolutionary processes. In this case ‘revolutionary’ means destructing old structures.

14

Concluding remarks

The attempt to preserve the ideals of the culture of the book, to optimize available structures by digitizing and networking seems to be unavoidable, but more likely diverts from the real potentials of the new media.

I took a greater interest in exploring innovative trends. If the new learning (and thinking) is not a continuation of the learning model of the last five hundred years, and if the new media do not represent an electronic transformation of the book and do not continue to chase after the ideal of parallel processing of information with poor interaction, what then could the new learning be? What could information look like that preferably does not strive after general validity. This exploration was based on the idea that everything that is familiar from the culture of the book is not revolutionary.

Post-typographical educational ideals qualify the high regard of homogeneity and enforced conformity in favour of heterogeneity and the consideration of of parallel processing. They qualify the relevance of technicized communication media and communication with poor feedback and draw attention to corporal media and dialogical forms of communication. They foster self-reflexive information processing.

It would seem that in the present transitional phase much more than negative demarcation is hardly possible. The vision is: Let us get away from guiding media, guiding knowledge, and guiding processing and find the way to

multimedial and ecological commitment. One step into this direction is the use of triadic models in cultural sciences.

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