The Zen Art of Teaching: Communication and Interactions in eEducation

Peter Baumgartner

Keywords: *Content Management Systems, Teaching Models, Weblogs in Education,*

Abstract:

This paper outlines three prototypical modes of teaching and learning and their consequences for the design of eLearning environments. I distinguish between transfer of knowledge (mode I), acquisition of knowledge (mode II) and construction of knowledge (mode III). Based on this theoretical framework I will develop the notion of "educational scenarios" and integrate this concept into a three level perspective: scenarios – interactions patterns – usage of tools.

As a sample demonstration of the usefulness of this approach I will explore the workflow structure of different kinds of content management systems (CMS). The workflow with its specific right and role management reveals an underlying action and communications structure, which is important for a categorisation of these tools from an educational perspective. I distinguish 5 different types of CMS suitable for different types of educational scenarios for eLearning: Production systems, Weblogs, Groupware, Portals and Wikis.

1   Three prototypical models of education

1.1   To transfer knowledge (Teaching I)

In this model the origin of students' knowledge is based on knowledge possessed by the teacher. Teachers know what students need to learn and it is the teachers' responsibility to transfer this knowledge into the student's mind as easily as possible. The transferred knowledge is abstracted knowledge prepared in a special way (the so-called didactical preparation), so that students are able to capture the content not only fast, but also to memorise it on a long term basis.

There are some links and relations of this model with behaviourism, a now outdated learning theory: The central tenet of behaviourism is that our behaviour is the product of our conditioning. So it claims that not our mental processes determine what we do. Learning is therefore a conditioned reflex which takes place through adaptation, a process in which the student's behaviour (reaction) simply results from an appropriate stimulus. Searching for appropriate stimuli cause the main theoretical and educational problems according to this theory. These stimuli have to be supported by adequate feedback to emphasise the correct (=desired by the teacher) mode of behaviour.

Behaviourism is showing no interest to the specific processes of the brain and considers the brain as a black box, which reacts to an input in deterministic ways. This model presents the brain as a passive container that needs to be filled. Behaviourism mainly focuses on steering behaviour and not on cognitive steering processes. And indeed: In occasions where we want

to train some basic skills this model is very successful. The language lab based on drill and practice presents a typical example. A further example of such "brainless" training refers to finger exercises for typing skills.

Although the simple stimulus-reaction-scheme has its merits it is already abandoned with respect to mental procedures. Nonetheless the image of a brain as a passive container to be filled is still very popular and in fact it is doing well in situations where learners are "newbies" to a certain domain and need some basic factual knowledge for their orientation. All in all this mode of teaching has legitimate usage when it comes to low level, static knowledge. We will call the teaching strategy of transferring knowledge as "Teaching I".

For the further elaboration of our main argument it is important to note that the organisational structure of the transfer arrangement is unidirectional. Knowledge goes from the teacher to the student; the teacher "gives", the student has to "take in", to absorb, to assimilate. Whenever a reaction of the student is required it functions as feedback to see if the knowledge transfer has worked successfully and produced the "correct" behaviour. From a systemic point of view we have two clearly defined systems where one system (the teacher) dominates and controls the other system (the learner).

1.2   To acquire, compile, gather knowledge (Teaching II)

This teaching model assumes that learning is an active process, which has to be planned, revised and reflected by the learner. The learner itself is an active entity and it is his/her activity, which supports or even is a necessary condition for the learning process.

To understand the differences between Teaching I and Teaching II better we have to refine our arguments. Even the simplest form of knowledge transfer (Teaching I) needs some activities by the learner (e.g. attention, listening etc.). The very dumb mode of learning by heart requires already a lot of engagement by the learner (e.g. rehearsal of the material to memorise). So even in the teaching model of transferring knowledge nobody will claim that the learner is not a human being in some kind actively involved in learning. The differences are on a more subtle level: In Teaching I the teacher is not interested to control or even observe the actual learning activities undertaken by the learner. What counts are just the results whereas in Teaching II the whole learning process with all its intermediate steps, its difficulties and provisional results are under surveillance by the teacher. In Teaching I learners essentially get the feedback wrong or true whereas in Teaching II teachers try to help to overcome wrong assumptions, wrong learning attitudes and to assist in the reflection process in order to aid the student to build up a consistent mental model of the subject domain.

Teaching II has kinship to cognitivism. The modern and today very likely dominant paradigm of cognitivism emphasizes in contrast to behaviourism an inner processes of the brain seeking to differentiate, investigate and bring these processes into mutual relation. Cognitivism seeks to develop a theoretical model for the processing operations between input and output of the brain, which in this case is not regarded as a black box. In contrast to the behaviouristic approach the brain is not merely regarded as a passive container, but as a "device" with its own processing and information capacity.

With respect to learning the basic paradigm of cognitivism consists of problem solving. In Teaching II the teacher provides (and controls) a learning environment where learners are able to withdraw, to collect, to gather, to compile etc. the necessary information to solve the presented problem or task. The learner has with certain required actions actively to acquire the necessary knowledge, the teacher observes the knowledge acquisition and tries to facilitate this learning process. In Teaching II the teacher is a tutor, a facilitator who watches and examines not only the product, but also the process.

Under these premises the teacher designs a specific learning environment and includes some "observation points" in order to be able to give feedback during the learning process. As there is no chance to look into the heads of learners teachers have to provide a communication structure. In contrast to Teaching I this communication is based on a dual way channel. Feedback is not only used to judge (wrong or right), but to provide means to help to find the correct solution.

Even if the communication goes into both directions this does not necessarily mean that teachers and learners are on equal terms. In Teaching II the teacher is a kind of moderator or panel chairman, who directs the discussion. But in contrast to Teaching I it is a real discussion, the moderator (teacher) considers carefully what the student has to say and as a result changes his/her attitude accordingly.

Please keep in mind that our description of the different teaching model is conceptual. So the apparently differences between these two models could be very small. Concerning Teaching I it could even happen that there are tasks and problems presented, but just presented. There are no built in observation points to facilitate the learning process. On the other hand in modern curricula nowadays we have permanent test situations meaning that a complex learning process is divided into many small learning products. In our understanding these "observation points" are test situations to judge the learning product. They give learners hints if they are on the right or wrong track, but these check points do not serve as an individual help provided by the teacher. They are just interim judgements. Even if teacher do react (for instance if many students have failed) by providing (e.g. presenting) additional information their teaching mode remains in the boundaries of model Teaching I.

There is a central difference to check points in Teaching I compared to Teaching II. Observation points serve in the first model to improve the transfer of knowledge (more precise, more concise, more effective etc.) to the audience, whereas in the second model the individual learner is supported to progress. To get the required status information from the learner a special learning mood has to be generated. Learners must trust teachers that they do not exploit their bad performance to their disadvantage.

1.3   To develop, to invent, to construct knowledge (Teaching III)

In the model of Teaching II all problems and tasks are presented by teachers. This has various consequences:

- Only the teacher practices the art of inventing and presenting problems. The student is taught to solve problems but not to "invent" and present them.
- For pedagogical reasons the problems chosen have only one clearly defined solution.
- For didactical reasons the problems are clearly cut and cleaned up so that the task at hand is evident and the solution is straight forward so that the problem can be solved in the limited time the curriculum guarantees.

In real life advanced knowledge especially professional knowledge [1,2] is irreducible complex, uncertain, instable, unique and governed by value conflicts, which are not solved by reason but by power. Without going into details [3] the characteristics of professional knowledge mentioned above assumes that we live in an inherently turbulent environment with indeterminate problematic situations, which "are not in the book".

This supposition generates a paradox: How can we teach problems nobody ever has confronted let alone solved? How can teachers teach so that students become better teachers than the ones they learned from?

In a wonderful short science fiction story Isaac Asimov [4] reflects on this apparent paradoxical situation: Children brought up in a futuristic society have to undergo a special test where it is determined which profession they are going to practice. All the knowledge of former generations is transferred directly in their brains by a special tape during the so-called Reading Day. Only the protagonist of the story is not treated by tapes but moved to a secret but wonderful and lazy environment where he is supposed to go around, to read, to talk to other persons who weren't treated by the tape either. Shame and pain characterized the feeling of the protagonist who was seemingly treated so different from all his friends and who was not educated ("tapped") for a special profession. What surprise as he learned that his apparently non-education was a special education for a special profession: He was supposed to become a tape builder, a profession responsible for new knowledge programmed into the tapes to guarantee the advancement of this futuristic society.

Sure, this analogy must not be taken literally: If we want to teach students to step onto the shoulders of teachers, to invent new things and to produce and generate new knowledge we have to provide a special learning environment. In this respect the analogy still holds. But instead of a lazy environment it has to be a challenging environment, which is sufficiently complex, uncertain, instable and unique so that old traditional knowledge or solutions do not work anymore.

In a certain way this teaching model is not any more a teaching model at all. There is no complete control of the learning situations by the teacher anymore. Teachers and learners alike have to immerse into a situation where the outcome is not predetermined. They both have to master situations at hand and the differences between teachers and learners maybe are only more experiences and more meta knowledge on how to reflect on complex situations (e.g. how to design local experiments) on the teacher's side.

Teaching III has strong links to constructivism. Constructivism refuses a so-called "objective" description (representation) or explanation of reality. Reality is considered as an interactive conception where observer and observation object are mutually and structurally linked. Even pure observation itself is a kind of activity, which influences the observed thing. In this aspect reality is observer relative as we can see not only in social science (e.g. to observe a human changes its behaviour) but also in physical science (e.g. relativity and quantum theory).

In order to avoid misunderstandings it is important to s ee that constructivism does not neglect the external world, does not support the philosophical theory of solipsism. Constructivism only says that there is no reality "out there" which can be perceived without a subject, the human mind. There is no "objective" god's eye, independent from a perceiving human mind. Neurophysiological studies show that our sensory organs do not just transfer the inputs form the outer world to our mind, but already come up with structures and interpretations during the processing stages. We see not colours and shapes but gestalt.

From a constructivist point of view learning is considered as an active process in which people construct their knowledge by relating it to their previous experiences in complex and real situations in life. In their practical lives people are confronted with unique, unpredictable situations the problems of which are not yet obvious. Therefore, in contrast to cognitivism, the solving of already existing problems is not the main priority, but the independent generating of the problem. These must be searched for in confusing, insecure, unpredictable and partly chaotic situations.

As in Teaching II where teachers try to help individual learners in their learning process there is a individual component in Teaching III as well. Students are constructing their knowledge by relating it to their previous experiences and lives. In that respect it is by no means Objective Knowledge in the Popperian sense [5] but Personal Knowledge as Michael Polanyi has coined it [6].

Teaching III requires a special two-way communication structure very different as in Teaching II. In Teaching I the communication is preset and controlled by the teacher whereas in

Teaching II and III the communication is on equal terms. But there is a crucial difference in Teaching II and III: While the communication in Teaching II is predominantly verbally in Teaching III most of the time there is no linguistic representation. The teacher *shows* the student how to do it! Either the taught thing is too complex, too multifaceted to express it in the serial structured language or the action process itself has inner qualities (body feelings, holistic indivisible characteristics), which prevent an adequate verbal representation.

There are many thinkers and philosophers who have worked out the limitation of the linguistic representation [7,8,9]. One example may illustrate their line of reasoning: The famous dancer Isadora Duncan was asked after one of her performances what the dance did mean. She answered: "If I could tell you what it meant, there would be no point in dancing it." [7, p137 and 464]. Whenever we can't express the meaning verbally we have to show it in real actions. The teacher has to show what s/he means and has to develop a special language, which is able to represent some aspects of the unspeakable. Language in this meaning does not necessarily mean linguistic expressions, it could be also e.g. the notation system of music, the notation system of check players, the graphic representation of buildings of architects, the so-called "body language" etc.

In Teaching II both teacher and learner are not only mentally but also bodily structurally coupled e.g. they function as intertwined systems. They learn from each other at the same time as they teach each other. The teacher can fail in mastering the situation and has his or her authority only by virtue of the greater experience and the trust the learner has to the teacher's guidance. The teacher takes the role of a "coach" or panel member in a discussion and thus loses his seemingly infallibility. A football trainer, for example, may not always successfully kick goals, or even be one of the best players of the team. Accordingly a teacher is confronted with the criticism of the reality, of practical situations. Teachers make use of their teaching functions by their experience and capabilities of assisting others dealing with complex situations.

1.4   Summary and applications

The following graphic summarises and compares the three different prototypes of education. As one can see these tree different types of teaching modes are neutral concerning the subject domain. Each teaching model can be used for humanities like sociology but also for technical sciences like electrical engineering. Clearly enough the problems are in each domain different and maybe their construction presents different levels of difficulty for the teacher. So it may be for instance not easily realisable (or even feasible) to construct a social laboratory where clear cut social problems are to be solved (Teaching II). The humanity type of domains tends to be complex, uncertain, unstable e.g. it is easier to construct situations for the model of Teaching III. But it is realistic to imagine a social situation where we design some isolated communication problems and present them – for instance in a (theatre) play like situation – to students. On the other hand it is sometimes dangerous to immerge students in real situations where they have to master technical problems. But think of the flight simulator as a prototypical model how media can be used to provide the required teaching model.
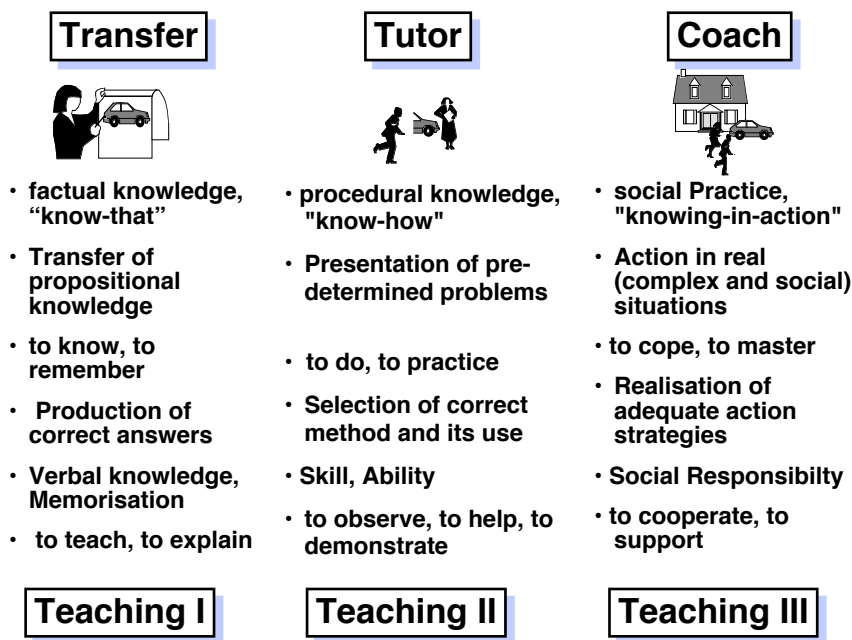
Transfer	**Tutor**	**Coach**
• factual knowledge, "know-that"	• procedural knowledge, "know-how"	• social Practice, "knowing-in-action"
• Transfer of propositional knowledge	• Presentation of pre-determined problems	• Action in real (complex and social) situations
• to know, to remember	• to do, to practice	• to cope, to master
• Production of correct answers	• Selection of correct method and its use	• Realisation of adequate action strategies
• Verbal knowledge, Memorisation	• Skill, Ability	• Social Responsibilty
• to teach, to explain	• to observe, to help, to demonstrate	• to cooperate, to support
Teaching I	**Teaching II**	**Teaching III**

Fig. 1: Teaching modes

On the other hand all teaching models are also neutral against the media they use. So we can imagine computer software for all three models ranging from programmed instruction (Teaching I) to problem solving software (Teaching II) to complex simulations and/or so-called micro worlds (Teaching III). It is said that the inherent nature of the Internet brings the real world into the classrooms and with the chaotic hyperlink structure it clearly advocates model Teaching III. But note: The Internet can also be used for Teaching I (transmitting PDF-Files or presenting web pages without hyperlinks or a narrow set of predefined sets of hyperlinks). Also keep in mind, that so-called interactive software not necessarily belongs to Teaching II or III. The crucial point is not interactivity itself (e.g. the interaction with the software), but if the interaction is watched either by the human teacher or the programme to give feedback to the student to improve his or her performance.

2 The Zen Art of Teaching

2.1 The Knowledge Loop

It is possible to see the different teaching models as different methods to provide optimal scaffolding for the individual learning career of a student.

1. Teaching I: At the starting point the beginner needs some abstracted knowledge to provide the theoretical foundations and to get some signposts, road markings and orientation points. This kind of factual knowledge is static and has no value by itself in a real and complex situation. It serves just as a shortcut to prevent to fall into traps and to help to organise his or her experiences without too many failures.
2. Teaching II: In this section of the individual learning career the student applies the abstract knowledge and makes his or her own experiences. In order to limit the action and reflection possibilities the learner interacts with a somewhat restricted, artificial environment, which is reduced of complexity and easy to control by the teacher. To

6

provide feedback this environment is designed in a way that includes some devices where students can deposit their interim product and teachers can inspect it. It is a kind of Zen art to construct this observation points in a way that they fit naturally into the learning environment and do not disturb or alter the learning process.

3. Teaching III: Teacher and learner work together to master problems. This model includes the generation or invention of the problem. The environment is constructed in a way that it represents at least in certain aspects reality or it is reality constrained by certain variables. There is a two-way communication on equal terms using either linguistic representations or other adequate kinds of languages.

4. Teaching I+: After the knowledge loop is completed the learner starts the loop from scratch but on a higher level or in another domain. Instead of just acting learners are revising their actions and experiences and try to improve or debug their performances.
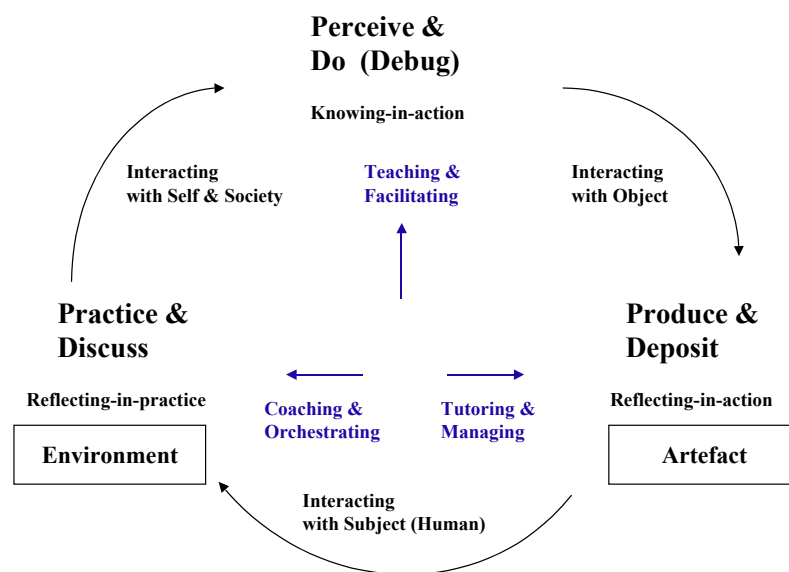

Fig. 2: The Knowledge Loop

The diagram above illustrates not only the different behaviour of teachers (inner circle) and learners, but also the action and communication structures.

2.2 Action Structure

When we inspect all the different types of actions during the knowledge loop we will notice a specific relation between knowledge and action respectively between human and the external world. Based on the work of Donald Schön [1,2] we are going now to describe these relationships in more detail.

2.2.1 Knowing-in-action and Knowing-on-action

It is pretty difficult to express and describe our actions exactly verbally. Well, everybody can utter the sentence: "I drive a car". But the feeling what that means is very different to different people. It is different to people who never drove a car and is different to people who own a fast car in contrast to people who never used a fast car. We live in the act and we feel what it means during the execution of the action.

But this is only the case with activities we use everyday, activities which are already (over)learned and routinely done. This kind of action knowledge is internalised, it is inseparable interwoven with the action itself. We call it with Donald Schön "Knowing-in-action". As an example imagine a skilled typewriter thinking or worse describing every action of his or her fingers. Sure, a beginner has to look at the keyboard and even to think which finger to move. But this is not a skilled action but an action to be learned. The knowledge is not in the action but separated from it. It is just Knowing-on-action which has still to be converted through a lot of practice into Knowing-in-action.

The main link in this learning phase is the relation of the learner to the external ("objective") world. In this case the objective world can also be represented by humans.

2.2.2 Reflecting-in-action and Reflecting-on-action

During the process from Knowing-on-action into Knowing-in-action verbal language (oral or written) is the perfect mode to transfer this kind of knowledge. Whenever the knowledge is settled into the body we need other means of communication. The performance itself demonstrates if the knowledge is already converted into Knowing-in-action. The only way to correct (to learn) the action is a reflection concerning the action execution and/or action product.

It is important to understand that this reflection process is inseparable from the action process itself. Imagine a jazz jam session where the musicians adopt to each other *during* their performance. In a certain way the adoption process *is* the performance, e.g. an artful jam session is nothing else as a skilled adoption process. This kind of reflection is called Reflecting-in-action whereas whenever we separate the reflection from the adoption we've got Reflecting-on-action.

The main link of this action structure is the relation to other humans, but in this case not as objects to "manipulate" but as a partner in a communication on equal terms.

2.2.3 Reflecting-in-practice and Reflecting-on-practice

Under the term "practice" we understand a series of skilled activities, which can be separated into more or less similar "cases". It is not necessary that these cases have the same characteristics and it is not even necessary that every pair of cases share a minimum of features. The connections between the cases are built by a specific pattern formed by a specific similarity in their characteristics, a similarity which Wittgenstein calls family resemblance [10, §67]. Reflecting-in-practice includes both types of reflected actions: Reflecting-in-action and Reflecting-on-action. It is Reflecting-in-practice when a practitioner reflects on a series of actions on a meta level: S/he reflects all the different cases in order to change the whole practice which in turn has consequences for every case.

The main link of this action structure is the relation of humans in their mutual actions towards each other and toward the external, objective world.

2.3 Communication Structure

We have argued that the type of communication is an essential property for each teaching model. In this section we specify the different elements of this communication structure. Our reasoning is based on the theory of communicative action by Jürgen Habermas [11,12,13], which itself has one of its foundation in the theory of speech acts [14] elaborated by Searle later on to a complete theory of mind [15].

2.3.1 Speech Act and Communicative Action

In the theory of speech act each linguistic utterance is divided analytically into the content of the sentence (predicate) and into the relation of the speaker to the world. These two parts – the propositional content and the illocutionary force – are not only linguistically represented but

can also be represented by actions. Whenever we enter a room we indirectly make the claim that the door is open so that we are able (or allowed etc.) to enter. On the other hand it is possible that the linguistically utterance itself is the action. For instance in the sentence: "I declare this conference open."
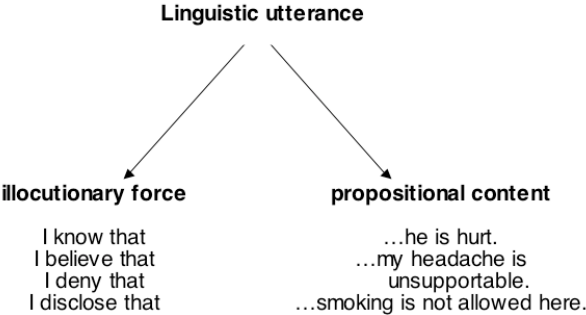

Fig. 3: Speech Act

Habermas elaborates this model in two directions:

- There is no direct relation from the propositional content to the world. The content is a representation of the state of the mind of the person. It is a *claim* that a certain condition in the world is valid but it is not the condition itself. Take for instance the sentence "I believe that he is hurt." This phrase could be wrong or true on two different levels: First he is not hurt and second I do not really believe it.
- Every validity claim hidden in a propositional content can be discussed exactly in three ways: As a challenge to the objective, subjective or social world. This threefold argumentation structure is valid for *every* claim. Let's take the above sentence as an example. I could deny that he is hurt because I have seen him and talked to him recently. (Challenge against the objective world.) I could deny that you believe that he is hurt, because you are a liar. (Challenge against the subjective world). I could deny that you have the right to conclude that he is hurt, because you are not in a responsible position to know, e.g. because you are not a doctor. (Challenge against the social world.)
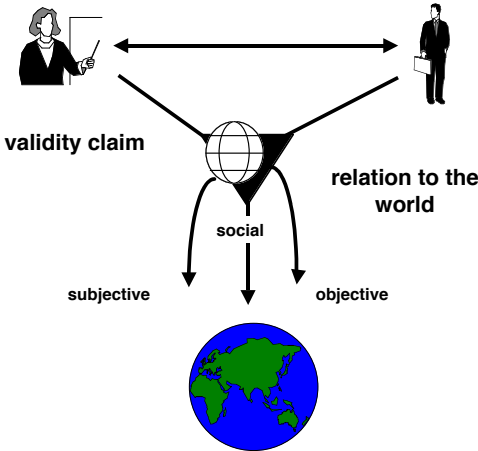

Fig. 4: Speech Act

2.3.2 Purposive and communicative action

Habermas distinguishes two fundamental types of coordination of action: control and consent. Control is characterised by purposive action. The aim of this type of action is to produce an effect on the world. Purposive action can be further differentiated by the distinction where the intended effect is produced - on the material world (instrumental action) or on other human beings (strategic action). Strategic action already is a form of social action: it includes another actor, but it is exclusively oriented toward a purpose (purpose-oriented).

It is easy to see that in Teaching I this kind of control-oriented action is dominant. In this model of action, the actor (the teacher but also the learner!) is exclusively interested in the consequences and the success of its own action. This orientation towards success isolates the actor from his social environment: For him or her, the other actors are but antagonists. In this model of action, humans become social objects that are indistinguishable from other elements of the situation, i.e. physical objects. When the means-ends-relation is considered the only form of human action, the lonely rational actor is confronted with an objective world that has to be controlled. The actor's attitude towards the world is one of objectifying. Relations of power and exchange are typical examples of strategic action. This can been seen clearly in the model of Teaching I. The teacher not only dominates the discourse and interactions, but s/he has also the power to classify right and wrong and to sanction the actions of the student.

In contrast to this action and communication model Habermas develops the notion of communicative action. Here the aim of the actor is not to get confirmation for his egoistic plans, but to constitute understanding and shared knowledge. Therefore language as a medium of communication plays a decisive role. Although in Teaching II the predominant goal is to convince the student from a certain aspect it is still oriented to understanding and shared knowledge. The teacher draws on different strategies (s/he demonstrates, explains, describes, shows, etc.) to build up shared knowledge but s/he does not use power and sanctions. In Teaching III the communication is more action oriented (as language is not feasible in any case) and it is more open to all kinds of communicative actions (teacher and student describe and explain but they also disclose, admit, demand, permit etc.)

In this model of action, actors are mutually dependent on one another because they must agree on and coordinate their plans of actions. Where, in a teleological model of action, action can be regarded simply as a relation between an actor and the world, the case of the understanding-oriented model of action is much more complex. Here we presuppose, for each actor, the same actor-world-relationship, but this time in the form of reflective relations. The actors do not relate directly to things in the world, but qualify their (speech)acts given that their validity can be challenged or criticized by other actors. The actors try to coordinate their plans of actions by consent and to execute them only under the condition of a collectively achieved agreement.
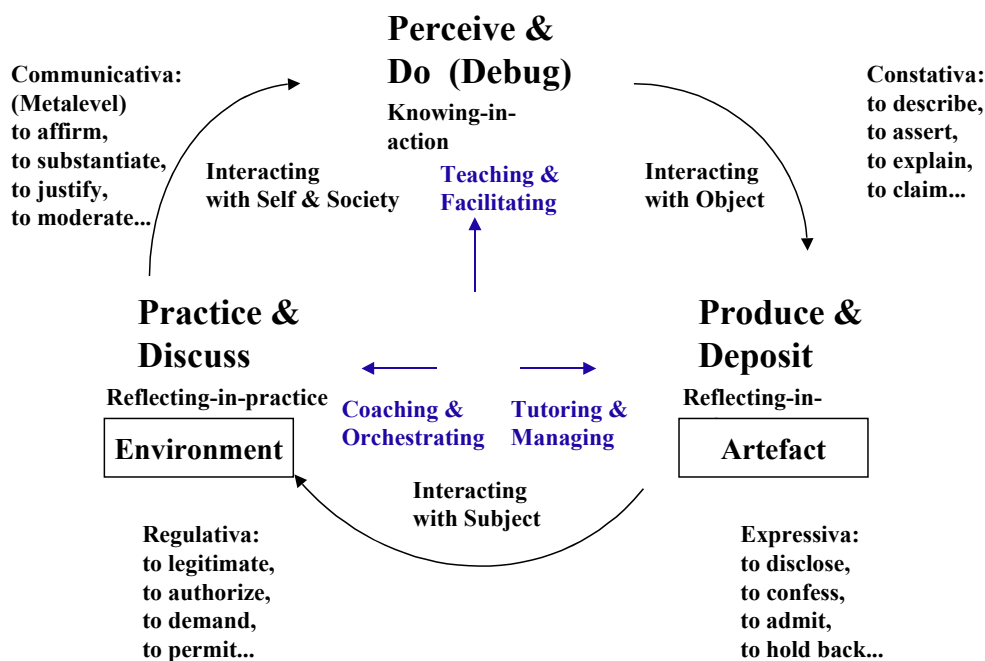
Fig. 5: Communicative Action and the Knowledge Loop

3 Categorisation of Content Management Systems

3.1 *Didactical Interactions as a Criterion of Differentiation*

After we have laid down the theoretical foundations we can now turn to the task at hand: What educational possibilities are feasible with a certain tool? Clearly enough this is a genuine question of education technology: What tool is an adequate support for a specific type of a teaching model? For what teaching model should we choose what kind of tool? (One could reverse this question and direct it to the developer of tools: What kind of tool do we need to support our educational goals? But in this paper we are only interested on questions directed to teachers.)

In a recent publication [16] we have examined over 130 Learning Management Systems (LMSes) and we described the functions of 16 systems in detail. In a forthcoming publication [17] we will follow up these evaluations with a survey of more than 250 Content Management Systems (CMSes) and a detailed description of 15 leading products. With the cooperation of Marco Kalz we categorised these huge amount of CMSes under pedagogical premises. It may not surprise that we have chosen "interactivity" as the crucial criteria. To be more specific we used the type and amount of *didactical* interactions.

Not every interaction with the tool makes sense in our educationally driven approach. Many interactions are necessary to manage the program (e.g. to navigate from one lesson to the next one). We therefore have distinguished between navigational and didactical interactions [18]. We are mainly interested in didactical interactions. The qualifier "mainly" is necessary as there is an inverse relation between these two types of interactions: The more complex the navigational interactions with the tools are, the more time, cognitive load etc. is lost for educational goals, e.g. didactical interactions.

3.2   Five different educational Types of CMSes

Under this pedagogical motivation we have sorted out 5 main types of CMSes.

3.2.1   The "Pure" CMS (P-CMS)

This type of CMS is the traditional CMS, which historically was also the first one to appear on the market. It is characterised by a workflow between different types of authoring rights. They are process and production-orientated, therefore we will call them P-CMS. Prototypically we discriminate between editor-in-chiefs, (who are overall responsible) co-editors (who are responsible for certain domains e.g. the business editor) and authors (who just write articles but have no rights to publish them on the website without inspection by the editors.) From the administration point of view we may differentiate between a managing editor (who is responsible for categories and scriptable functionality of the CMS) and a graphical editor (who designs the templates).

From our educational point of view these authoring rights can be mapped onto educational functions like teacher, assistant teacher, guest teacher for the content and head master and administrator for the organisational issues. The person to whom the content is directed (the reader) is in our case the learner or student. It should be clear enough at this point that this type of CMS represents in our notion the knowledge transfer model of teaching (Teaching I). Typical examples for this type of CMS are:

- Mamboserver: http://www.mamboserver.com/
- OpenCMS: http://www.opencms.org/
- Plone: http://plone.org/
- Typo3: http://typo3.org/
- ZMS: http://www.zms-publishing.com/

3.2.2   Weblog Content Management Systems (D-CMS or Weblog)

„...weblogs are pages consisting of several posts or distinct chunks of information per page, usually arranged in reverse chronology from the most recent post at the top of the page to the oldest post at the bottom…Some weblog authors devote each day's post to an entire page, while other authors organize their sites by other criteria besides the date in which posts are made." [19, p.7]

Because of its chronological order weblogs can be used as a discussion-oriented tool for a personal process-related reflection. There are two functions, which are important in an educational context:

- TrackBack: This is a notification mechanism, which allows authors to link their comments to an ongoing discussion over the net {W01, W02}. The BackTrack mechanism not only generates an interwoven network of virtually (web) related speech acts but it also shows in the so-called referrers how many people entered from a special source (website) to the ongoing discussion.
- Syndication: This is a way where authors can spread their content. It is a special format (RSS = Rich Site Summary or Really Simple Syndication, {W03}) which other authors can subscribe to. They even can integrate the text from the subscribed source into their own website (weblog). {W04, W05, W06}. Syndication works as a kind of an automatic and interrelated quotation system over the internet.

Weblogs can best be understood as discussion-oriented tools, which have the potential to spread the discussion all over the world. With the custom to write short personal comments ("micro contents") weblogs animate discussion within the weblog, where the comment has originated, but at the same time it supports a kind of meta-cognition in the own weblog and therefore spreads the discussion over the globe. In this sense weblogs are almost a perfect match for Teaching II but can also be used for Teaching I (e.g. as a traditional P-CMS) or even better for Teaching III. (For their multi-purpose use weblogs are already called Swiss Army Tools {W07} but as we will see there is yet another – better suited – candidate for a multi-purpose tool.)
Examples are:

- Blogger: http://www.blogger.com/start
- Manila: http://manila.userland.com/ and. Radio http://radio.userland.com/
- Movable Type: http://www.movabletype.org/
- pMachine: http://www.pmachine.com/
- TypePad: http://www.typepad.com/

3.2.3 Collaborative oriented CMS (C-CMS or Groupware):

Essential for these systems is the common development and administration of shared resources. Here we can find a kind of protected interaction of a specified group. There exists no broader audience where these interactions are aimed at. There is also no intention expressively announced for a specific learning goal: The members of this work group learn by doing/working collaboratively. Even if there could be a differentiated system of authoring rights, the prototypical application treats all members of the workgroup equally. In our theoretical framework this type of CMS is best suited for Teaching III.
Typical examples under this category are:

- BSCW: http://bscw.fit.fraunhofer.de/ and http://www.bscw.de/
- Convea: http://www.convea.com/
- EGroupware: http://www.egroupware.org/
- IBM Lotus Notes: http://www-306.ibm.com/software/lotus/
- PhpGropupware: http://www.phpgroupware.org/

3.2.4 Content-Community-Collaboration Management Systems (C3MS):

C3MSes are the former already mentioned Swiss army knife for teaching. This type of CMS offers the possibility for (virtual) communities to develop domain specific content. They use collaborative mechanisms and many specialised modules (e.g. who is online, ratings, surveys, reviews, quotes, etc.) are extremely community-oriented. C3MSes can work as traditional P-CMSes, as well as collaborative weblogs. Combining all contributions on one website a C3MS can be used to build up a domain specific repository. (For more details on this type of CMS from a pedagogical point of view see the excellent paper by [20] and our own portal {W08}).
The perfect match for a C3MS is – as is hinted already by its name – the model of Teaching III. As different modules can be switched on and off it can be used very easily for the other teaching modes as well. Typical examples are for this new kind of CMSes are PhpNuke: http://phpnuke.org/ and PostNuke: http://www.postnuke.com/.

3.2.5 Wiki Systems:

Wiki systems reverse the central feature of CMSes – their differentiated systems of authoring rights. The core principle of Wikis can be expressed with the phrase: Everybody can change everything! Behind this simple approach is hidden – in terms of our theoretical framework – the assumption of an ideal consent oriented communication structure of a Habermasian provenance. And the interesting thing: Although this idealisation by Habermas was criticised many times by contemporary scholars it works as far as Wikis are concerned! Look for instance at the Wikipedia – a joint enterprise for a web based lexicon {W09}. This common enterprise started January 2001 and collects now already 302.617 English articles. Meanwhile the idea has spread into 96 (!) languages, where 12 of them have already more than 10.000 articles and into 5 sister projects (Meta-Wiki, Wiktionary, Wikibooks, Wikiquote and Wikisource). And note: All this work is done voluntarily and for free!
The term Wiki was coined by Ward Cunnigham, who was inspired by the local busses in Hawaii, which translates to "fast" [21]. A CMS-Wiki is a group of applications (WikiWebs), which uses a special markup language (WikiWords) for their publishing system. The interface is extremely simple and this is maybe one of the main reasons for their fast and wide distribution.

Like Groupware Wikis are collaborative-oriented software but they push the notion of collaboration to its limits. Wikis burst the boundaries of a specified group (everybody in the world is free to collaborate) and of a clearly defined right system (everybody can write, add, revise and edit and even delete every article!). Nobody is the owner of the article s/he has started. Wikis can be compared with the ideal of an egalitarian community like communism: Everybody owns the work of everybody. There are two interesting mechanisms, that assure the system is working:

- For beginners there is a special section, called sandbox, where people can try out the system until they feel comfortable to use it.
- If some people write funny text or misplaced articles then the community itself purifies the WikiWeb. This is not done by just deleting the entry but by transferring it to special "funny" pages, where it can be inspected later on without harming the project.

Under our theoretical framework Wikis are situated in the realm of Teaching III, which is – remember – no purposeful teaching at all. All the different Wiki installations are either based on different programming languages or have distinct features, modifying the original Wiki. Examples for Wikis are:

- Wiki: http://c2.com/cgi-bin/wiki (the original Wiki)
- Twiki: http://twiki.org/ (for business use)
- Swiki: http://minnow.cc.gatech.edu/swiki (based on the Squeak programming system)
- Zwiki: http://www.zwiki.org/FrontPage (based on Zope)
- JSPWiki: http://www.jspwiki.org/Wiki.jsp (based on Java Server Pages)

3.3 Summary and Conclusions

The following two diagrams represent our theoretical framework so far. In the left part we have included the different types of CMSes in relation to the most suitable teaching model. It is clear that the boundaries are overlapping and that every tool – in one-way or the other – could be used for every teaching model.
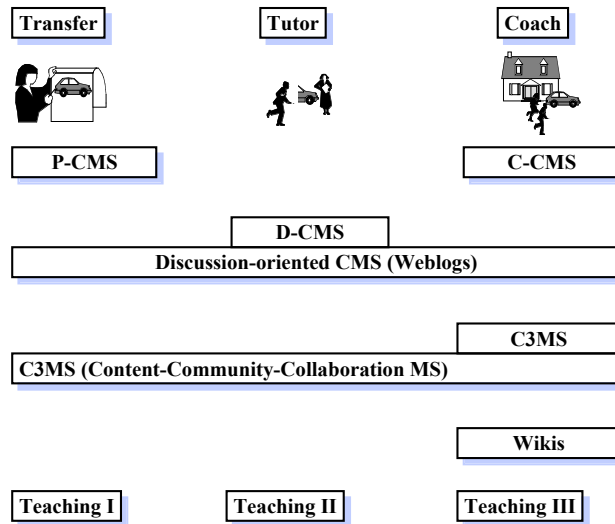
Fig. 6: Teaching model

There are many tools which can be used as a hammer, but there is only one tool type specialised for a specialised task e.g. to force nails into walls. Depending on the size of the nails and the material of the walls we are using even a special variety of hammers. Above the teaching model where we have determined the main usage for a certain CMS we have doubled the thickness of the box to represent this preference for the corresponding teaching model.
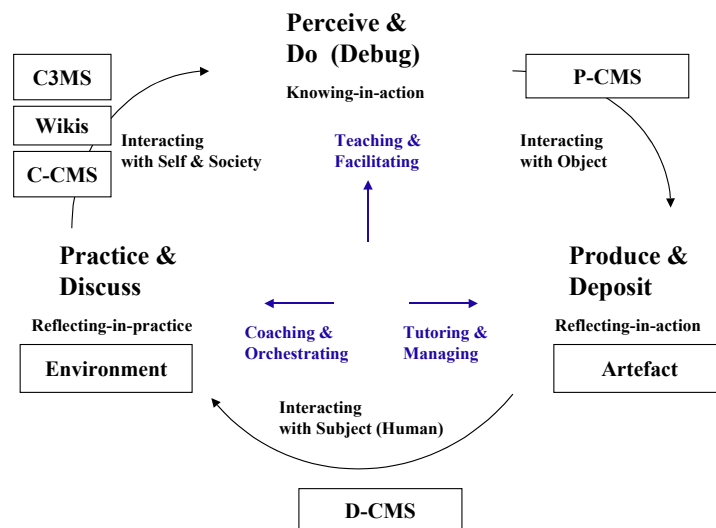

Fig. 7: Knowledge Loop and Type of Content Management System

In the knowledge loop (the graphic on the right hand side) we have added the most appropriate tool to support the required activity.

A third schema represents the predominant challenges and/or claims we are hypothesizing with our theoretical framework when using different types of CMSes. The graphic relates the different categories of the CMSes to the type of world, which is challenged (objective, subjective or social world) whenever we work with this specific tool. But keep in mind that this is just an approximation as every claim can be always challenged by objective, subjective and societal reason at the same time.
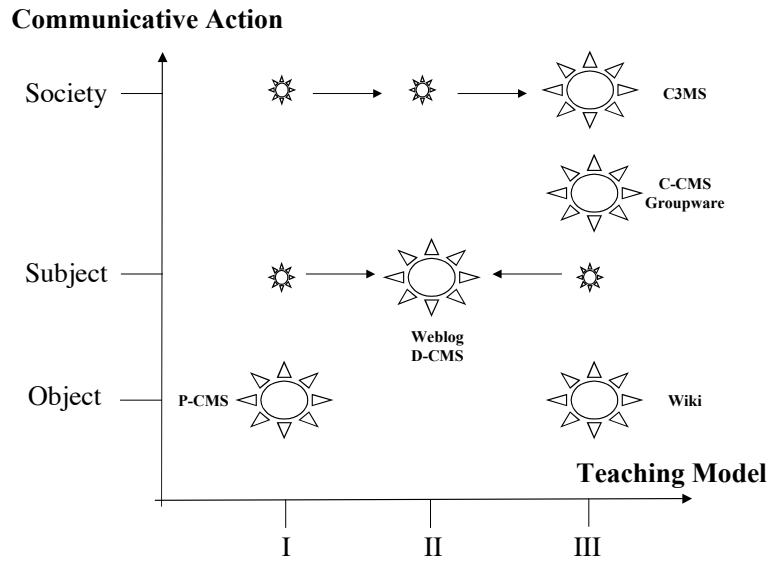
Fig. 8: Predominant mode of challenge/claim in relation to teaching model and type of CMS

4 The intrinsic revolutionary potentials of weblogs

We come now to the end line of our reasoning. So why should especially weblogs have the potential to revolutionise the organisational structure of traditional teaching environments (Teaching I)? Why should Groupware, Wikis or C3MS, which are situated at the higher level of the knowledge loop, e.g. in Teaching III, not have the same or even more revolutionary potentiality?

Well, we believe the reasons are twofold:

- Firstly – as can be seen from the last diagram –, weblogs are the only tools, which are mainly oriented to the subjective world of the learner. This means they are not an obvious contradiction to the objective (the teacher) and social environment (the teaching organisation). In this respect weblogs are a kind of partisan software: They can be introduced step by step into a traditional teaching organisation without provoking an immediate clash of cultures. (Imagine by contrast the introduction of a Wiki as the official working system for a special field of studies and you know what we mean. There will be immediate protest by the central computer service department, which rightly fears all kind of security risks.)

- Secondly, there is another special feature of weblogs other tools do not possess. Weblogs have the inherent tendency to cross the boundaries of the teaching environment as they organise the discussion across a network of linked websites. In contrast all the other tools we mentioned are confined to one centralised server, which is owned by one organisation.
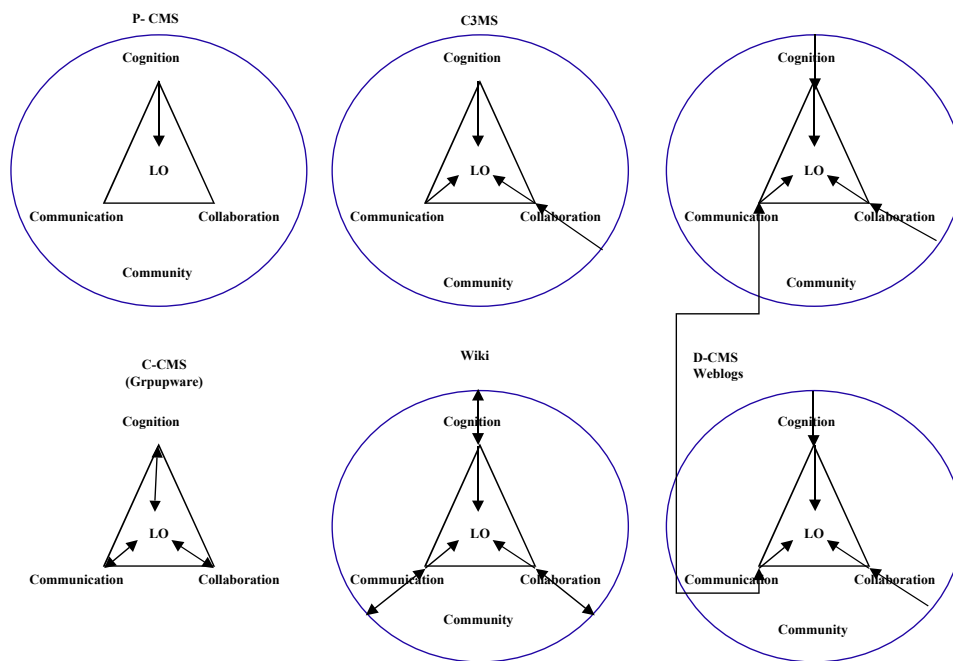
Fig. 9: Different types of CMSes in relation to the different aspects of the world and actions structures

To demonstrate this thought we use the so-called didactical triangle, which is formed by cognition, communication and collaboration [22]. In our theoretical framework this represents grosso modo Teaching I, II and III. A circle around the triangle represents the community and the abbreviation LO stands for Learning Object, e.g. the interaction with the content. Without going into details of this complex diagram it demonstrates clearly that weblogs rupture the symmetry. In order to represent the different relationships we have to include a second weblog (didactical triangle) representing the world (server) outside the observed and characterised teaching environment respectively teaching organisation. This explains why weblogs have an inherent revolutionary aspect for the change of a teaching culture from Teaching I to Teaching II and III.

5 References:

[1] Schön, D. A. (1983). The Reflective Practitioner. How Professionals Think in Action. New York, Basic Books.
[2] Schön, D. A. (1987). Educating The Reflective Practitioner. Toward a New Design for Teaching and Learning. San Francisco, Jossey-Bass.
[3] Baumgartner, P. (1993). Der Hintergrund des Wissens. Vorarbeiten zu einer Kritik der programmierbaren Vernunft. Klagenfurt, Kärntner Druck- und Verlagsges.m.b.H...
[4] Asimov, I. (1986). Profession. In: The Mammoth Book of Short Science Fiction Novels. I. Asimov, M. H. Greenberg und C. G. Wuagh. London, Robinson Publishing: 1-45.
[5] Popper, K. R. (1979). Objective Knowledge. An Evolutionary Approach. Oxford, Clarendon Press.
[6] Polanyi, M. (1962). Personal Knowledge. Towards a Post-Critical Philosophy. Chicago/London, Chicago Press.
[7] Bateson, G. (1972). Steps to an Ecology of Mind. A Revolutionary Approach to Man's Understanding of Himself. New York, Ballantine Books.
[8] Langer, S. K. (1984). Philosophie auf neuem Wege. Das Symbol im Denken, im Ritus und in der Kunst. Frankfurt/M., Fischer.

[9]   Wittgenstein, L. (1984). Tractactus logico-philosophicus. Works, Volume. 1. Frankfurt/M., Suhr-kamp.

[10] Wittgenstein, L. (1984). Philosophische Untersuchungen. Works, Volume. 1. Frankfurt/M., Suhr-kamp.

[11] Habermas, J. (1981). Theorie des kommunikativen Handelns. Handlungsrationalität und gesell-schaftliche Rationalisierung. Frankfurt/M., Suhrkamp.

[12] Habermas, J. (1981). Theorie des kommunikativen Handelns. Zur Kritik der funktionalistischen Vernunft. Frankfurt/M., Suhrkamp.

[13] Habermas, J. (1984). Vorstudien und Ergänzungen zur Theorie des kommunikativen Handelns. Frankfurt/M., Suhrkamp.

[14] Searle, J. R. (1969). Speech Acts. An Essay in the Philosophy of Language. Cambridge, Cam-bridge.

[15] Searle, J. R. (1983). Intentionality. An Essay in the Philosophy of Mind. Cambridge, Cambridge University Press.

[16] Baumgartner, P., H. Häfele, et al. (2002). E-Learning Praxishandbuch: Auswahl von Lernplattfor-men. Marktübersicht - Funktionen - Fachbegriffe. Innsbruck-Wien, StudienVerlag.

[17] Baumgartner, P., H. Häfele, et al. (forthcoming). Auswahl und Einsatz von Content Management Systemen im Bildungsbereich. Innsbruck-Wien, StudienVerlag.

[18] Baumgartner, P. und S. Payr (1999). Lernen mit Software. 2. Aufl.Aufl. Innsbruck, StudienVerlag.

[19] Bausch, P., M. Haughey, et al. (2002). We Blog. Publishing Online with Weblogs. Indiana, Wiley.

[20] Schneider, D. K. (2003). Conception and implementation of rich pedagogical scenarios through collaborative portal sites: clear focus and fuzzy edges. International Conference on Open and Online Learning (ICOOL), University of Mauritius.

[21] Leuf, B. und W. Cunnigham (2001). The Wiki Way - Quick Collaboration on the Web. Boston, Ad-dison-Wesley.

[22] Schulmeister, R. (2004). Didaktisches Design aus hochschuldidaktischer Sicht - ein Plädoyer für offene Lernsituationen. In: Didaktik und Neue Medien. Konzepte und Anwendungen in der Hoch-schule. U. Rinn und D. M. Meister. Münster, Waxmann. 21: 19-49.

URLs:

{W01}: Explication of the TrackBack mechanism: http://www.movabletype.org/trackback/beginners/
{W02}: How TrackBack works:
http://www.cruftbox.com/cruft/docs/trackback.html
{W03): RSS 2.0 Specification:
http://blogs.law.harvard.edu/tech/rss
{W04): How Syndications works:
http://www97.intel.com/scripts-syndication/HowWorks.asp
{W05}: Syndication in Manila:
http://weblogs.userland.com/manilaNewbies/usersguide/syndicationprefs/howsyndicationworks
{W06}: What is RSS?
http://rss.userland.com/whatIsRSS
{W07}: Weblog as a kind of Swiss army knife?
http://istpub.berkeley.edu:4201/bcc/Winter2002/feat.weblogging2.html
{W08}: PostNuke Portal of the department of Educational Technology of the Fernuniversitaet in Hagen
http://bildungstechnologie.net
{W09}: Wikipedia:
http://en.wikipedia.org/wiki/Main_Page

Author:
Peter Baumgartner, Univ.Prof. Dr. phil.
Fernuniversitaet in Hagen, Institute for Educational Science and Media Research (IfBM).
Department of Educational Technology
TGZ, Universitätsstr. 11
D-58084 Hagen
Tel. +49 -2331 987 2982
Peter.Baumgartner@fernuni-hagen.de