"Surfing Global Change": how didactic visions can be implemented

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Abstract

Purpose – Aims to examine a negotiation-oriented and partly web-based game "Surfing Global Change" (SGC) invented by the author based on didactics of self-managed learning and successfully implemented in WebCT.

Design/methodology/approach – Along three historic generations of web-based teaching (WBT), the key functionalities of any platform (content, discussion and evaluation) are perceived to be utilized in a characteristic way depending on the prevalent didactic concepts. The changing roles of teacher and students are highlighted using the example of SGC Level 3, where students assess one another's competence, each trying to outdo the others in controversial arguments

Findings – The outlay of Surfing Global Change aims at accomplishing sustainable results for complex themes. Thus SGC sets out to weigh out competition vs consensus, self-study vs team work, emphasizing one's own standpoint vs readiness to compromise, differentiation into details vs integration into a whole. SGC hence wants to mirror professional realities along five interactive game levels: learn content and pass quizzes; write and reflect a personal standpoint; win with a team in a competitive discussion; negotiate a complex consensus between teams; integrate views when recognizing and analyzing global long-term trends.

Research limitations/implications – Some interactive assessment functionalities are still missing in current platforms.

Practical implications – In advanced university courses the negotiation game SGC was repeatedly used as a procedural shell for interdisciplinary themes.

Originality/value – The paper shows that a "communicative space" is created by utilising mainstream web platform technology, capable of transposing visions of "progressive education". The definition of three generations of WBT allows for a functional differentiation in the styles of using web-based tools.

Keywords Self managed learning, Game theory, Role play, Learning methods, Worldwide web

Paper type Research paper

1. Theory of role-play to be applied on the web

This text utilizes existing and readily available IT technology for practical academic objectives. The idea here is not to create a new web learning platform, but to use existing ones in order to implement contemporary didactic convictions. A concept and its foundations have been extensively developed earlier in this journal in an article concerning the web-based negotiation game "Surfing Global Change". In addition to the usage in the context of advanced university courses, the proposed procedural shell of "Surfing Global Change" could also be used for consulting purposes in industry and administration.

In our world of technological innovations, "social innovations" are key to consistency of progress.

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1.1 Motivation for the five levels of "Surfing Global Change"

The motivation of the game "Surfing Global Change" is to create an environment in which optimized learning of "competence to act" and consensus building for creating a sustainable future take place.

The name "Surfing Global Change" indicates that societal actors might wish to "surf" on the waves of long-term socioeconomic trends in order to steer towards sustainability.

The personal inclination of the author and trainer is to prefer taking didactic risks (incl. receiving criticism from students) in order to allow for radically new social and educational experiences. Also Bork (2001, p. 196) states: "We need new approaches"! A review of education theories relevant for SGC follows in section 1.3.

The didactic goal of this game is that students are trained for their personal proactive and responsible professional role in building a sustainable global society (Rauch and Strigl, 2005) departing from whichever discipline. Didactic and educational aims are extensively described in (Ahamer, 2004a) and determine both the architecture (structure) and dramaturgy (process) of SGC.

The learning goal of the complete five-level game (logo in Figure 1) "Surfing Global Change" is to master the procedures of consensus building, prevalent and expected by many developed societies.

The overall five-level architecture of "Surfing Global Change" is displayed in Figure 1 of Ahamer (2004a), symbolized as game logo inside Figure 1 and enumerated below. The procedures in Surfing Global Change want to approximate towards socially and environmentally sustainable results for complex themes. Thus SGC sets out to balance competition vs consensus, self-study vs team work, emphasizing one's own standpoint

Figure 1.
Roots and shoots of SGC

vs readiness to compromise, differentiation into details vs integration into a whole. SGC hence wants to mirror professional realities along five interactive game levels:

(1) learn content and pass quizzes;
(2) write and reflect a personal standpoint;
(3) win with a team in a competitive discussion;
(4) negotiate a complex consensus between teams; and
(5) integrate views when recognizing and analyzing global long-term trends.

For several practical implementations of Surfing Global Change until now, both synchronous and asynchronous web-based communication was employed for usage both in the context of lectures, as well as between lectures. Among others, the following functionalities of a web platform were used:

- anonymous surveys for debriefing and feedback (level 0);
- structured content for voluminous fact-based information as starting kit (level 1);
- quizzes for monitoring students' cognitive performance (level 1);
- discussion forums for stepwise review and update of standpoints (level 2);
- quizzes in voting procedures defining the winning team (levels 3-4);
- quizzes when substantiating own decisions for a winning team (levels 3-4); and
- postings in discussion forums with attachments of global analyses (level 5).

SGC does not partially rely on only one of the educational paradigms, but goes through all major ones and beyond them along the five levels: behaviourism – cognitivism – constructivism – meta-constructivism (e.g. "transformative design": Kalantzis and Cope, 2004, p. 52). To increase "bandwidth" of understanding, SGC reconciles real and virtual dialogue, equivalent to "blended learning, which is frequently recommended but rarely questioned (e.g. by Oliver and Trigwell, 2005).

In the author's understanding, digital media are perceived as a vehicle for self-guided learning in thematically and communicatively open structures. Web platforms are able to create public space as an easily accessible "home" for newly forming groups and as mentally comfortable "living room" for learners. Virtual spaces favour different profiles of "being shy vs proactive" in communication (Dwight, 2004). Virtual communication facilitates "taking roles, which in turn allows exploring various perspectives. Repeated and positive experience since 2003 has shown that such is practically possible.

Such reliance on "perspectivism" (Grippe, 2002, p. 8) might be easier understandable for participants with their own professional experience (as embodied by lifelong learning: Hedge and Hayward, 2004), than for first-year students (Katz and Yablon, 2003). Additionally, in earlier years beginners might have been largely unfamiliar with e-communication (Spennemann and Atkinson, 2003).

In SGC's most central level 3, which is focused on in this article, choice is made for role-play supported by means of "digital game-based learning", as thoroughly laid out in the "classical" book by Prensky (2001). Game-based learning not only surpasses the old paradigm "information transfer, but also the more recent elearning paradigm 'tutorial learning' (Bork, 2001, p. 196ff). Tutorial learning only increases quantitatively

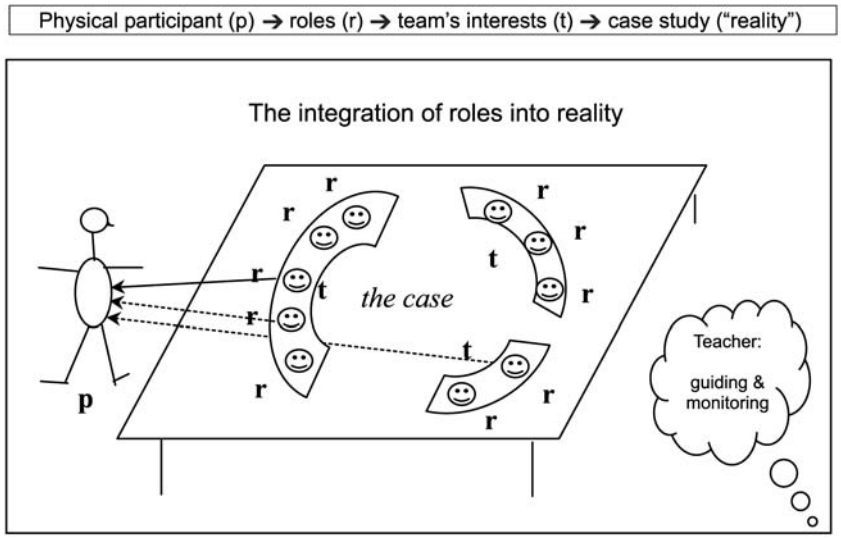
the intensity of the traditional flow of interaction (teacher ↔ students, i.e. "more of the same"; cf. Geissinger, 2001, p. 122; or as in video-lecturing: Verma and Parikh, 2001, p. 29), but does not add quantitatively new flows (such as student (student) to process structures.

Often, WBT (web-based teaching) platforms, readily available on the market, did not yet leap over this conceptual threshold, either. Even seemingly collaborative, platform design often still sticks to the relatively common "student vs knowledge" pattern, replacing the older "student vs teacher" pattern. Using old IT language: students remain "clients, not "masters" in education networks (Verma and Parikh, 2001, p. 33). There might be "feed-back", but little "feed-around", "creating feedstock" or even "feeding others" by students.

1.2 What is implied by taking "roles" and "playing"?

The organisation of the game scenario requires that physical persons take one role as a member of a team. Each team represents an important stakeholder in the real-life case. The chain of integration from "playing" individuals to "actual" reality is here depicted as a left to right stream in Figure 2.

On the table of perceived reality, team interests face each other. Depending on the chosen role, each player perceives the real case differently (Moss, 2005). The table represents the game environment defined by its rules. The teacher (cloud) turns into a trainer or facilitator, who remains on a meta-level outside the game without taking sides during argumentation. The physical player (left in Figure 2) can mentally enter or leave roles or teams (arrows), he even could mentally switch teams). Even if mostly not covered in literature on role-play (Murphy and Gazi, 2001): exactly such change of standpoints is what drives the learning effect in "Surfing Global Change"!



Note: The chain of integration of playing individuals into reality: a physical gamer (p) "identifies with a role (r)" while "knowing the own team's interests (t)" after having surveyed perspectives and details of the real case which is on the table (left to right)

Figure 2.
The chain of integration

In all levels of "Surfing Global Change", the participants continuously oscillate between the roles of the reviewer and the individual being reviewed, between actor and spectator, between fighting inside the arena of the circus or watching from outside on the benches. Technically speaking, "playing" is very much such an unstable balance around a diffuse equilibrium point, where acting forces are explored by "soft" deflections of the system's state vector around a point of "optimum".

Resulting communication processes occur in multiple ways: information is passed on between players, as well as between teams, information is transmitted from the trainer to players and vice versa, and (instead of "information") circulates between the same: scores, assessments and documentation. (For example, students' assignments from preceding years accumulate to comprehensive reference material for students of subsequent years, like in Levin *et al.*, 2005). IT needs to take such enriched social patterns into account.

Consequently, focus here is not placed on sophisticated technological elaboration of the learning scenario with Hi-Fi graphics but on triggering auto-enforcing social and affective processes in students: this is how students learn.

Seen from an evolutionist perspective of human history (de Chardin, 1969, p. 194), exchange of parcels of advantage and disadvantage between stakeholders (Mankiw, 1990, p. 1645) lubricates the process of finding an equilibrium on the market of goods (general equilibrium theory) – such view can also be understood more generally as the marketplace of interests in a society. Using the vocabulary of economics, insufficient exchange of advantages and disadvantages in life represents "market imperfections" (or even market failure), which is always undesired. Before the background of such considerations, a bottleneck of social evolution can be widened by "lubricating" humans' capacity to exchange, comprehend and incorporate opposing viewpoints. Discursive democracy is the target process to be trained (Dudley *et al.*, 1999) with SGC. Generally, it can be hypothesised that (mental) structures grow as a second-order effect of (mental) through-put.

Using the words of Roth *et al.* (2001), "Spielraum" means – for teaching – "room to manoeuvre, room to play", I understand it as a concept of force-free librating (mathematically speaking: of the systems state vector) in elbowroom towards new optima of energy of whatever kind: such leeway is given to students during role-play! – If successfully "floating", a state of "flow" (analogous to Csikszentmihalyi (1990), for individuals), can be hypothesized for the entire social system.

1.3 Review of relevant theories and applications of learning

New patterns of values in education and learning have emerged for the past decades (for a logical structure see Davis and Samara (2003)):

- responsibility of the self by Rogers (1974);
- high effectiveness when learning at an appropriate, "sensible" time: Montessori (1996);
- building consciousness through auto-regressive processes starting out from a baby's trial & error experiences: Piaget (1988);
- constructivism denying truth can be imposed on others by force: von Foerster (2003);

- emerging co-operative learning is used as the title of a special issue (Shwalb and Shwalb, 1995), and studying is replaced by collaborative learning altogether (Glover *et al.*, 2004, p. 72), while learning is regarded "as an interactive process" (Klabbers, 2000);
- "open learning" (Evans and Fan, 2002, p. 130): interactive, adaptive, simulative;
- "multiple literacy" (Kellner, 1998 and 2004) towards multicultural democratization, advancing a culture of dialogue (Ahamer, 2005b) to avoid a clash of concepts;
- with the rise of an "economy of knowledge" cultivation of free exchange and circulation of ideas (Trifonas and Déspres, 2004);
- the conception of the American educationist John Dewey "organic community" (Leander and Duncan, 2004, p. 422; Berding, 2000) revisited in virtual space, his thoughts concerning pragmatism and social constructivism (Grippe, 2002);
- move towards a "society of sense", Horx (2000), requiring "labourers of sense";
- "flow state" when appropriate dynamism and equilibrium of demand and performance is reached: Czikszentmihalyi (1990);
- the concept of "deep learning" in education for sustainability (Warburton, 2003);
- concepts and expertise in monitoring "social dynamics" has accrued in the last decades (Rauch, 1985, 1999); and
- "homo ludens" as a human oscillating and librating between approaches instead of sticking to one "correct" view: Huizinga (1994).

Such renewed views on "learning" became implemented in enjoyable experimental educational institutions trusting human's own potential "to find and select what would be worth learning" such as:

- the libertarian school of Wild (1990a, b) in Ecuador;
- other Latin American experiences with "alternative education" based on Paulo Freire (Brown and Bohrer-Brown, 1995, p. 257);
- in Austria the school Knallerbse (2005) and Kindergarten Kocher (2004), both based on century-old "progressive education" (in German "Reformpädagogik", reviewed in Ahamer, 2005c, d), similar to Sudbury schools (2003); and
- other examples in the Austrian landscape of progressive education as evaluated in Fischer-Kowalski *et al.* (1995) and trained for in Gierlinger-Czerny and Peuerböck (2002).

However, recent developments in web-based learning make use of such renewed values only to a limited extent:

- "dynamical historiography" with pre-conceived, built-in models of civilization like Burns (2002) or Ip *et al.* (2001);
- preconceived learning scenarios proposed e.g. in Kerres (2000);
- purely fact-oriented lectures are still predominant, as, documented in Koubek and Jandl (1999); and

- autonomous learning behaviour often contradicts traditional cultural values (Ho and Crookall, 1995, p. 237).

The "added value" of web-based teaching (WBT) in the learner's view could easily prove as insubstantial (Katz and Yablon, 2003, p. 52) when restricted to a cognitive approach, while leaving out constructivist paradigms. In such cases (e.g. for beginner's lectures) "reduced effort" might be more of an attractive motivator for teachers.

Intrinsic motivation plays a major role only in a limited number of projects, which are described in Lepper and Malone (1987), Naidu *et al.* (2003) and Prensky (2001).

It is mentioned now (before speaking of level 3) that level 2 of SGC trains one-to-one review capabilities (Ahamer, 2004a, ch. 2.3 and 2005e).

2. The rules of level 3 in the game "Surfing Global Change"

This section describes the game rules of SGC level 3 as outlined in Ahamer (2004a, Tables VII and VIII) and defined in chapter 2.4 of Ahamer (2004b).

After the participants have decided on two concrete themes for case studies, they decide for a suitable matrix (Figure 3) in order to differentiate the case into sub-themes (according to the tradition of "value benefit analysis", weighing relative importance):

(1) The students decide which role (which type of protagonist) they want to represent as a team inside the chosen theme, e.g.:
   - proponent of the (building) project;
   - civil authority deciding on the permission to implement this project (e.g. by means of an environmental impact assessment procedure EIA);
   - lobby of economy and industry; and
   - lobby of the environmentalists.

(2) The formation of teams is governed by the formula: (individual's points) = (team's points)/(number of team members), therefore, the team size is expected to be optimized between very small (not enough manpower) and very large (too little share of the reward) team size.

(3) Each team has one team speaker for communicating decisions externally.

(4) Only the team speaker is known by the trainer, the process of team formation, inner constitution and definition of internal roles is left to the students.

(5) Team leaders have the right to expulse members (e.g. if they fail to collaborate).

(6) The students have one week to prepare common and shared standpoints as teams (2 pages/person) respective the theme that was agreed on beforehand.

(7) One week later the (mostly four) teams are to post their standpoint in form of a consistent and balanced document onto the web platform as preparation.

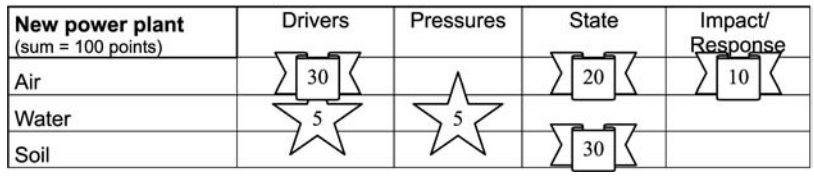


Figure 3.
A fictive example for a matrix filled in by a team (text describing the meaning of the single matrix elements concretely is left out here)

(8) On the day of the level 3 game, all single teams are asked to sit at their tables in the center of the class room (inner part of Figure 4) and they are given a sheet of paper with the matrix (e.g. 3 × 4, showing headings for rows and columns, as well as definitions for each matrix square similar to Figure 3).

(9) As outlined in Figure 5, for 20 minutes each team has to place (mostly a total of 60 or 100) chips onto each square, thus weighing the relative importance of the effects of the project in the sense of a preliminary assessment, which is handed over only to the trainer who acts as a moderator.

(10) This preparation time is supposed to further consolidate the team and the team members' internal roles.

(11) The rule for the level 3 discussions is as follows: the trainer (or supporting software) randomly selects matrices from one square after the other and continues to ascertain which teams have placed chips.

(12) Only teams that placed chips participate in the discussion on the respective subject and follow the pursuant rules of the discussion time: (time in minutes) = (sum of placed chips on this square)/(number of involved teams).

(13) The remaining teams that have not placed chips plus the students representing the other theme (spectators in the outer part of Figure 4) form the public with a right to vote (e.g. directly or also via the platform).

(14) The trainer indicates the start and end of the discussion (e.g. with an alarm clock or a software on the web) but refrains from participation in the content or procedure.

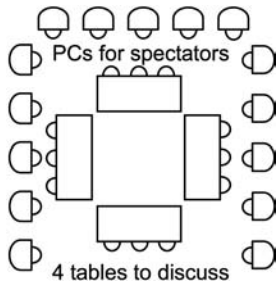


Figure 4.
Suitable classroom

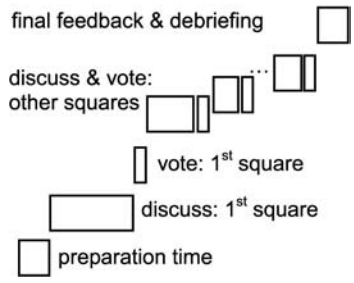


Figure 5.
Time plan for level 3 discussions

(15) After the end of the discussion the "public" has the following options for voting:
- each single participating team has won the discussion; and
- no team has won the discussion (e.g. low quality of all arguments).

(16) In case (1) only the winning team receives the reward according to the following formula, in case (2) no team: (potential team's points) = (sum of chips set on this square).

(17) The voting public may give a reason for their decision and receives 1 point for each posted reason.

(18) Criteria for polling are:
- quality and clarity of the academic argumentation;
- quality of the communication of arguments;
- composure during discussion; and
- ability to perceive and understand other teams' arguments.

(19) The trainer or else the software keeps record of all teams' point budget throughout the game.

(20) A final session allows students to reflect on their performance in discussion, on expected and unexpected social processes (e.g. open or hidden alliances) and on achievements made.

Summing up, we see an atmosphere of competition in level 3, which heads for an argumentative battle between standpoints. Different standpoints are induced and impersonated by different teams playing different societal roles. The main interest of teams is to win or else to reach expression of consensus. Moments of play or even gambling (similar to roulette) are introduced by putting the relative weight of aspects (= matrix elements) at stake. Possibly realistic democratic (or even Machiavellist) effects are generated by the rather decisive voting procedure, which contrasts the own with the others' interests (see Figure 5).

Results of level 3 are decisions between standpoints.

Social setting is vivid competition on the spot between teams who can develop strategies to win against others under severe time constraints.

The level 3 points contribute to the entire SGC score by adding up, in (Ahamer, 2004b), the other levels' rules are not repeated here given space limitations.

3. Evolution of roles of teacher and student in SGC

SGC sets out to permit for an organic maturation of standpoints through five levels (see Figure 6) as follows:

(1) small isolated packages of traditional content originating from single disciplines, representing only one side;

(2) a process of iterative text-oriented criticism permitting deliberation on a one-to-one basis (Sivan, 2000; Ronteltap and Eurelings, 2002) mediated via asynchronous virtual communication;

(3) a quick process of situation-dependent need to present and defend own arguments as a function of the adversary's behaviour and strategy on a

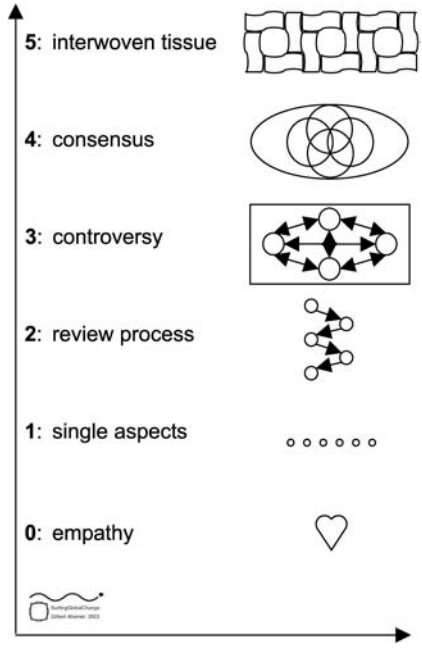


Figure 6.
Symbolic depiction of the social and communicative setting, in which the five phases of SGC develop: the evolution from dwelling upon single technical details towards a coherent or even holistic view

many-to-many basis inside a team in synchronous real-time communication (Reilly, 2003; Schwartz and Teach, 2002; Salter, 2003);

(4) a consolidation process with less pressing time restrictions in real-time communication on a many-in-one boat basis in the need of consensus within synchronous real-time communication (Klabbers, 2003; Kirk, 2004); and

(5) a closing activity of creating a global view integrating many standpoints heard until then by creating an analysis outside severe time restrictions on an individual or freely chosen team "we just for us"-basis in the context of web mediated asynchronous communication (Myers, 1999; Meadows, 2001).

The social skill of moulding different or even contradictory standpoints into one multi-faceted view is crucial to the interdisciplinary matters the author had to teach during the last six years (see Table I). In this light, "Surfing Global Change" could be seen as a dramatic shell useful for interdisciplinary university courses when making use of new didactic concepts.

Eight implementations of Surfing Global Change at two universities to date have shown that the objective of enhancing skills for consensus finding and academic substantiation have been reached by a majority of the over 200 students involved.

Table I.
The increase of complexity in assessments for typical course subjects

Environmental technology (UT)	Technology assessment (TA)	Systems analysis (SB)
Single facts Still unconnected	Weighed assessment Still linear thinking	Mutual interdependence Systemic thinking

4. History of "Surfing Global Change": third generation of web teaching

This entire negotiation game is based on a history of previous experiences of the author in the context of interdisciplinary university teaching (see Figure 7). Since 1999, three "generations of web teaching" set out to implement increasingly the specific

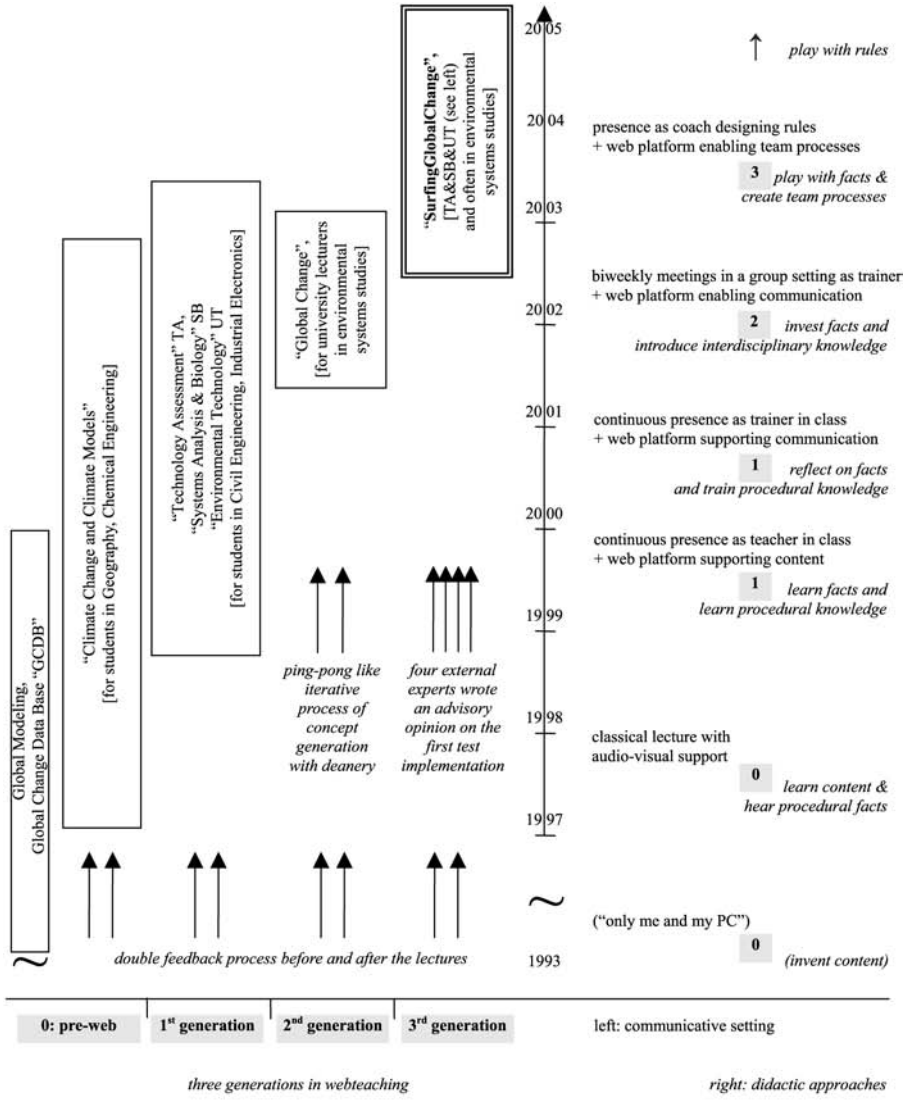


Figure 7.
Historic roots of the game Surfing Global Change (double frame) as based on the author's previous work

Notes: Historic roots of the game Surfing Global Change (double frame) as based on the author's previous work. Years indicate summer semesters; generations indicate steps in implementing communicative structures; arrows denote inputs; the right hand side shows the conceptual basis (communication and didactics)

chances of web platforms, namely enhanced communication and student-centred learning (details on the generations in Ahamer, 2004c, 2005a).

The peer-orientation of the third generation in this "functional historiography of WBT" surpasses the more media-oriented "fifth generation distance education" in the model of Taylor (2001).

4.1 Series of monitoring, advisory checks and reviews

A ping-pong process consisting of reviews, critiques and updates was conducted in order to improve the initial version of SGC. This process is contained in the double framed box in Figure 7 and depicted in Figure 8 in detail.

In November 2002, the idea (incorporating all five SGC levels) was inspired by the social processes from the meanwhile "classical" Environmental Impact Assessment (EIA, 1997) framework known in most industrialized states. A literature review strengthened both gaming and e-learning approaches. After having presented his idea and game design to the team of the EU-funded Unigame project, the author took into account comments and codified the game rules (February-March 2003). Due to the propensity to distance learning in the Unigame project team, a new platform was programmed and finished with some delay – the educational motivation and decision might have gone astray in the meantime, however. Technological details came into the focus of Unigame. In March 2003, students of Information Design affiliated to Unigame commented to the project team that there would be no visible added value when transposing the game entirely to distance learning without physical contact.

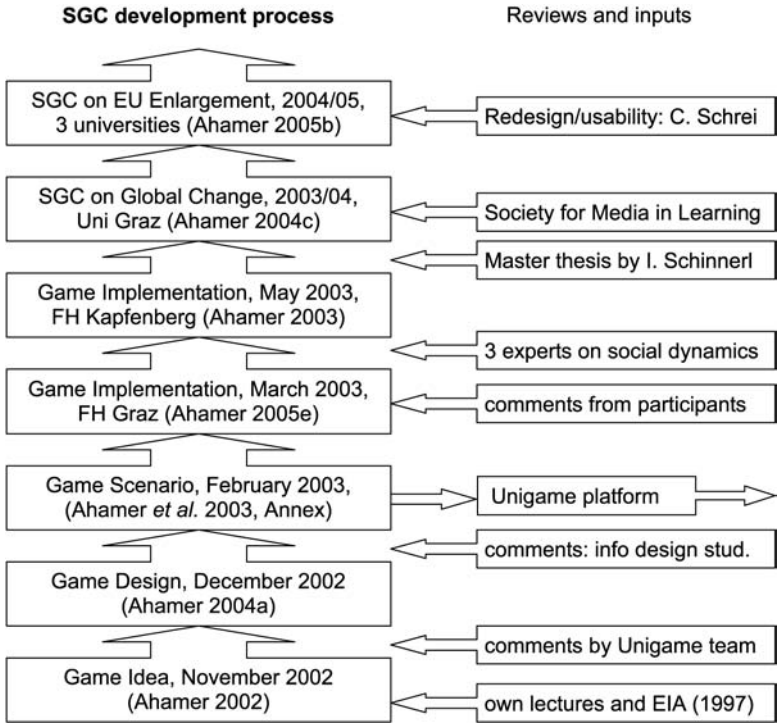


Figure 8.
The series of monitoring, advisory checks and review processes helping to develop the game SGC during 2002-2005

In order to sharpen the capability of the complex system of game rules to lead to increased self-responsibility in trained students, the author has commanded three external experts on social dynamics and higher education to monitor discussions in the lecture room in March 2003 (e.g. Rauch, 2003). The style of game management has been adapted according these reviews. In a similar way, a Master's thesis has been conducted where students have been extensively inquired about their gaming experiences in guided interviews (Schinnerl, 2003), concluding that "the skills for self-directed learning are still insufficient" (Schinnerl, 2003, p. 4) among students and that the teacher would have to enhance them. In the light of these four important sources of detailed feedback and utilising the regularly scheduled feedbacks from participating students, the following game implementations at three universities have been enriched.

Student satisfaction rose from initially very low levels (mainly at the University for Applied Science FH, in compulsory courses) to very high levels (at Graz University, in facultative courses). An anonymous review in 2004 by two experts from the professional German-speaking Society for New Media in Science (GMW) have brought to light that usability was still poor, whereas educational design was judged up to date. Therefore, in 2005 the author has commanded a graduate from "Information Design" to create new design, new icons and to boost "usability" (compare e.g. Duckwitz and Leuenhagen, 2004) of SGC. A second GMW review in 2005 yielded an overall positive picture – thanks go to all who were involved in this development process!

4.2 The direction into which the three generations evolved didactically

As a consequence of decisions made in section 1, the focus here is not placed on sophisticated technological elaboration of the SGC's learning scenario but on triggering auto-enforcing social and affective processes in students. Lipponen and Lallimo (2004, p. 114) emphasise in their paper "From collaborative technology to collaborative use of technology":

> Thus, instead of focusing extensively only on the technology, one should turn towards thinking about the social settings that support the implementation and use of technology. This way of thinking reflects an important transformation from a technology-centred to a human-centred approach in the context of collaborative technology.

The present and next sections reflect the utilization of three basic functionalities in WBT, namely content – communication – assessment. In order to organise different modes of utilisation better, the idea of establishing "three generations in WBT" (summarised in Table II) is employed (defined in Figure 7). Table III indicates principal directions of developments.

Table II.
Key words characterizing the three generations of WBT

First generation	Second generation	Third generation
Cognition	Construction	Autopoiesis
Drill	Training	Empowerment
Teacher	Trainer	Moderator

Such an outline of "three generations" might be hypothesised as the three first steps of future societal evolution towards a network of free human peers according to the cosmology of Teilhard de Chardin (1969, p. 265ff):

Web-based Teaching → Training → Learning → Gaming → Living

("Networked life" comes close to multi-perspectivist interculturalist life (Hofstede, 1994; Tschandl, 2001; Ahamer, 2005b).) Human evolution might point into the direction of self-organisation and self-responsibility (Riedl, 1996). Inter-peer collaboration is highly facilitated through communication, the web acting as important tool towards the present transition into the "Planetary Phase", as called by Raskin et al. (2002, p. 9).

4.3 How technology can be used along three didactic generations

Developing the above "3 × 3" concept (three functionalities of Table III in 3 generations of Table II) in more detail and taking the experience of several own interdisciplinary courses will represent axes of a matrix as depicted in Figure 9. The vertical axis illustrates how three characteristics (I) content, (II) communication and (III) assessment (in bold with Roman numerals) have evolved regarding concrete didactic objectives of web-based learning (leftmost column of Figure 9). The three "generations of WBT" (Arabic numerals for the horizontal axis) respond to these didactic objectives (above dashed line) and transpose into technological solutions (below dashed line, in italics).

It is possible to read along rows or columns, depending on the reader's question. Figure 9 tries to incorporate four dimensions into one array: generations, functionalities, targets and implementation.

As a result, it becomes visible that very high importance is attributed to the "discussion forum" (df) as a web-based tool, even if it is quite unspectacular and does not produce attractive screenshots to be published in a journal.

At this point I would like to formulate a request addressed to platform technicians: it would be extremely helpful in technical terms to have a discussion forum with integrated voting facility that automatically aggregates the voting results in a suitable way (as necessary for level 1-2 and level 3-4 of SGC) – but also for other implementations of co-operative WBT.

A very practical conclusion is that for social coherence of participants it is crucial to allow for a large portion of informal online conversation, even if the appearance of students "fooling around" at first sight is frequently observed. Creation of informal structures proved as necessary for the team-building process, at least in the initial

(I) Content	More open, less prescribed, more negotiable, more collaborative, more consensual	
(II) Communication	More blended learning, more own creation and own construction, exchange of views and assessments into more directions	
(III) Assessment	More mutual assessment, based on increasing self-determined motivation	
	From: one reads results of assignments (1 teacher)	*To*: all read result of "assignments" (many students)
	From: trainer decides on success (grades)	*To*: participants decide on success (voting)
	From: one-way communication	*To*: multi-way communication

Table III.
Key directions of development of functionalities along three generations of WBT

(i) **Characteristics**, (ii) didactic targets are transposed by (iii) *technology* …	… in **WBT** = web based …		
	… teaching: **1st** generation	… training: **2nd** generation	… learning: **3rd** generation
(I) Regarding **content**:			
open or closed?	closed learning environment	open learning environment: cases to be selected	open learning environment: cases to be found
	the traditional "script uploaded"	*list of cases linked or uploaded*	*generation of case in discussion forum*
prescribe content?	compulsory vs. optional content	content of cases to be created	content for cases to be retrieved
	*mark by *, "what is needed for exam"*	*students post assignments in df*	*students convene to find themes by df*
"truth" = what?	"truth" is correct content	"truth" is plausible and functioning teaching material	"truth" resulting from ethics of negotiable contracts
	learn what is uploaded	*create and post own part of script*	*retrieve info in web and compile own perspective of case*
how to produce "content"?	learn manuscript & answer questions	collaborate inside a team	reach consensus between teams
	pass online quiz	*mould partial docs into one standpoint*	*debate using posted standpoints*
(II) Regarding **communication**:			
real or virtual?	possible is: "pure" distance learning	blended: face-to-face and online	blended: face-to-face and online
	student faces only "content", not views (real vs. virtual is basically uncritical)	*student faces values and aims of teacher and teammates*	*student must absorb others' mindsets & reconstruct own stance*
research = what?	dwell into prepared material	create and design own content	create and weigh out consensus
	students devour downloaded docs	*participants upload descriptive scripts*	*upload digested downloaded views*
discussion forum	for posting & grading assignments (1:n info exchange)	for agreeing on work procedures & work targets (n:n)	for exchanging and commenting standpoints (n:n)
	students deliver & teacher "corrects" "home-work" cases individually	*df helps to agree on details inside a team. docs repository, version mgt.*	*df crucial to slip into perspectives. df becomes panel and marketplace.*
web activity (hits)	low	Medium	high
	click on content modules, only once post your own doc	*watch the df threads concerning only yourself*	*monitor the entire landscape of expressed opinions*
(III) Regarding **assessment**:			
quizzes	for determining grades	to evaluate each other	for grades and voting decisions
	quiz score yields grade for lecture	*participants create own quizzes*	*monitors opinion in cast votes*
surveys	for expectations and feedback	create own surveys	for expectations, feedback & voting
	Initial and final survey as monitoring for teacher	*as a co-designer, upload them in WebCT*	*anonymised means to deliver peer assessment details*
composition of final grade	quiz plus two assignments graded by teacher	aggregating actions	quiz, peer review, points won through voting & from trainer
	grade computed outside platform	*simple formula in WebCT for grade*	*elaborate formulae in WebCT*
learning process	three single events	continuous	granulated, improving steps
	either peak load or leisure	*iterative parcels documented in web*	*reflect & amalgamate iterative portions*
control by oneself or by others	trainer controls	team-control	self-control
	Students follow	*students flock together*	*students organise internal constitution*

Notes: *df* = discussion forum, *doc's* = documents

Figure 9.
How (i) course characteristics (bold), (ii) didactic objectives (normal font) and (iii) their technological implementation (italics) (all three in hierarchic rows, Roman numerals) evolve along three generations of WBT (in columns, Arab numerals)

phases of last years' implementation of SGC in real distance learning void of any personal contact, because students were engaged for a practical semester in geographically dispersed firms.

5. Simple technology for academic learning by way of using a web platform

Table IV illustrates the details, of which WebCT functionalities are used for implementing the didactic features. Figure 10 shows how the three main functionalities of the web platform were used for the past years in practice. Figure 11 combines three screenshots of the steps of a web-based voting procedure.

Practice shows that the implementation of some didactically motivated ideals of the trainer remain difficult to achieve with present-day learning platforms: the 8-4-2 game in level 1 (Thiagi, 2001), the students' assessment in level 2 and especially the computation of points as a result of inter-student feedback and assessment in level 3. In brief (and similar to conclusions in Glover *et al.*, 2004, p. 73), all requirements that match with a peer-oriented, self-assessing vision of learning, cause technological difficulties.

Technologists and designers of learning platforms are therefore strongly encouraged to consider shifts in didactic visions in order to allow their products to overcome barriers, and progress from content-centred studying to peer-review-centred learning!

Level	Didactic feature	Web-based implementation in WebCT
0	Initial expectations	Anonymous survey with ten questions
1	8-4-2 words game	Three surveys for answers and three surveys for voting, shown to students in class via video projector
1	Check of basic knowledge	Quiz with 15-20 questions (cover partly compulsory, partly voluntary subject-matter) with automatic computation of points
2	Review and update process for standpoints	Discussion forum with one thread per author; MS Word attachments using "track changes" feature for comments, points added manually
3	Convene on a theme and afterwards on a matrix	Informal usage of discussion forum among students or voting for the final decision
3	Team's standpoint	One posting in discussion folder per team
3	Competitive discussion process	Face2face in class, dice for selection of matrix elements, alarm clock for time measurement, casting votes by raising hands in class
3	Reasons for voting decision	Quiz with one question and repeated access
4	Consensus discussion process	Face2face in class, alarm-clock for time measurement, casting votes by raising hands
4	Reasons for voting decision	Quiz with one question and repeated access
5	Integration into global trends	Require and receive global trend patterns to be posted by trainer, post one integrative text in discussion forum either personally or in groups

Table IV.
How the single SGC elements are implemented in WebCT

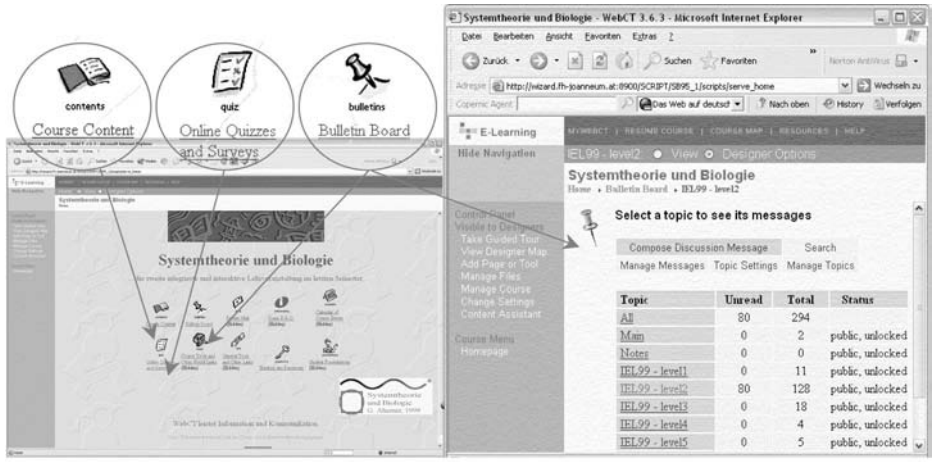


Figure 10.
A web teaching platform

Notes: A web teaching platform has three important functions (circles above left): course content, online quizzes for assessment, and the bulletin board (= discussion forum), which is shown here in detail (right). Below left: course homepage, initial version as of 2003

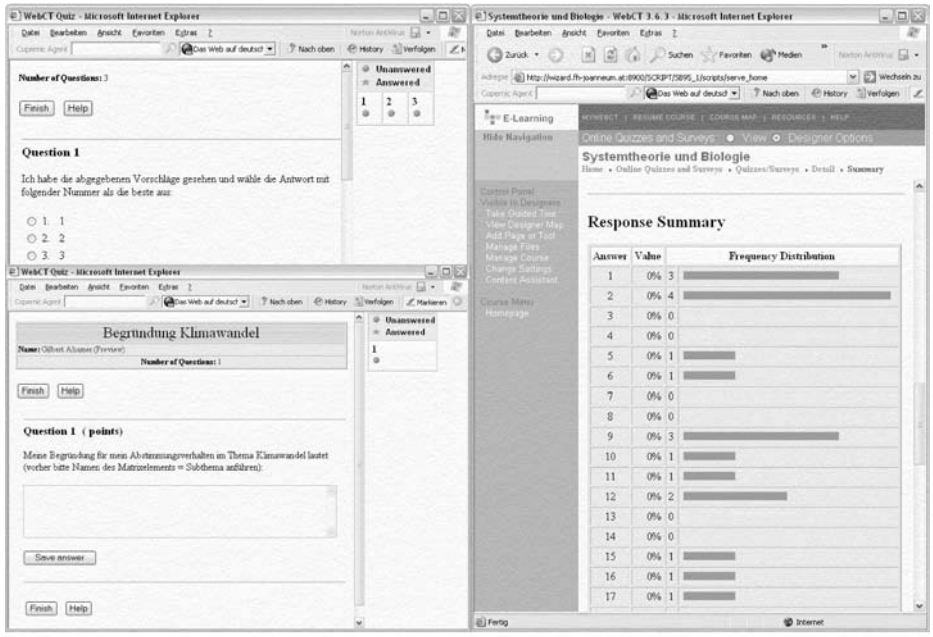


Figure 11.
Web-based voting procedure

Notes: Web based voting procedure in level 3 used for selecting a matrix for each of the two themes is implemented as an anonymous WebCT survey. Upper left: multiple choice question, lower left: text box for specifying the reason explaining the choice, right: result of the voting procedure

6. Conclusion: technology should meet novel academic learning

After eight implementations of "Surfing Global Change" (SGC) with advanced university students at two universities from many different curricula we may conclude that SGC's dramaturgy can well be applied for advanced interdisciplinary training of academic and social skills, which are essential for generating commonly shared solutions for complex techno-socio-economic issues.

The social design of SGC targets basic democratic skills like fostering the capacity of argumentation and melting diverse viewpoints into consensus.

The role-play design allows students to flexibly represent standpoints and views in complex real-world cases. Switching between such perspectives is at the core of the academic training intention of SGC, because participants will gain more insight into argumentation with real-life adversaries when working in civil engineering, urban planning, energy management and similar areas.

The way in which content, communication and assessment have been implemented along three proposed "generations of WBT" has been described in detailed tables.

Collateral coaching activities during all SGC levels by an interdisciplinary oriented trainer are able to balance, channel and smooth present-day technological shortcomings which are still entailed by readily available web learning platforms. While the design of the five levels of "Surfing Global Change" allows for mutual feedback and peer assessment during the gradual process of self-directed learning and team building, the utilised web platform does not yet enable automatic handling of resulting scores by a novel teacher-students peer structure.

Providers of learning platforms are hence encouraged to leap onto progressive didactic concepts, particularly considering the longstanding educational history they base upon.

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