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RESEARCH PAPER

Training to bridge multicultural geographies of perspectives

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Abstract

Purpose – This paper seeks to argue that global change calls for training in intercultural, interdisciplinary and interparadigmatic professional behaviour. Thus a concrete web-based five-level training procedure "Surfing global change" (SGC) is to be proposed that includes reflection of game players' own knowledge, views and values. Rules of SGC are to be defined in detail.

Design/methodology/approach – Based on a didactic analysis, the design of the negotiation game SGC is a rhythmised sequence of learning content, reviewing colleagues' work, debating competitively and constructing a consensus on a multi-stakeholder theme. Hereby learners acquire a 360° view of the issue and learn to understand their adversaries.

Findings – For two dozens of themes, Surfing global change has successfully been implemented for students of "Global studies" and of "Environmental systems analysis" and other interdisciplinary curricula at several universities.

Practical implications – Practically, one or two dozen students can follow two or more weekly hours during a semester in order to play "Surfing global change". A wealth of multi-stakeholder themes can be explored using this gaming procedure moderated by the author. Learners bridge "geographies of perspectives".

Social implications – Resilience and employability of students increases with their improved intercultural, interdisciplinary and interparadigmatic skills.

Originality/value – This paper defines the normative set of rules of this original game created by the author. Surfing global change has already attracted international rewards.

Keywords Negotiation game, Review, Perspectives, Interdisciplinary, Intercultural, Interparadigmatic, Surfing global change, Change management, Negotiating, Learning

Paper type Research paper

1. What present workplaces look like

Global change calls for concrete didactic procedures in order to react on it suitably.

This article identifies three groups of trainable skills for which suitable professional training should be foreseen: interculturality, interdisciplinarity and being situated in multiple (interparadigmatic) value systems (Hardaker, 2007, p. 1; Hardaker *et al.*, 2007, p. 127); all having to be met in an optimal case.

Which training can we offer to members of a multicultural and multiparadigmatic society? This article outlines a suite of a five-level negotiation game that trains responsible self-organisation by situated learning, targeting consensus in society.

The presented role-play "Surfing Global Change" is a training procedure for policy makers, educators and academics working in multi-stakeholder settings such as environment, civil engineering, technology assessment, spatial planning, infrastructures, peace work and global administrative cooperation.

Campus-Wide Information Systems
Vol. 29 No. 1, 2012
pp. 21-44

1065-0741
DOI 10.1108/10650741211192037

1.1 Interculturality

As a practical example, the author's recent placements have included local, national, European and global strategies to safeguard environmental quality, climate and sustainability as well as political and administrative coherence in a larger geographic space, e.g. the European neighbourhood (Figure 1, read from below). The profiles of today's workplaces are defined by on-going processes of globalisation.

"Cultures" of understanding are experienced as substantially different:

- between employees in administration, industry/business or academia, also;
- between organisations and institutions (including corporate cultures, compare McCracken and Wallace, 2000, p. 431);
- on both sides of the former "Iron Curtain" cutting a continent into two halves;
- as a function of characteristic cultural patterns (e.g. power distance, uncer-tain-ty avoidance, individualism, masculinity etc; as defined by Hofstede, 2010);
- depending on corporate missions such as environment or economic success.

Hence skills are required to converge the perspectives of all "human resources" involved in any concrete work task (Global Studies, 2010). As an example, the Azerbaijani system of vocational education should meet both requirements of national non-oil industry, of students leaving school and of international customers buying Azerbaijani products (Ahamer and Strobl, 2010, p. 15, Schmidt, 2010, p. 383).

It is helpful to note that this article understands "interculturality" not only in the traditional sense as (often geographically, ethnologically or religiously defined)

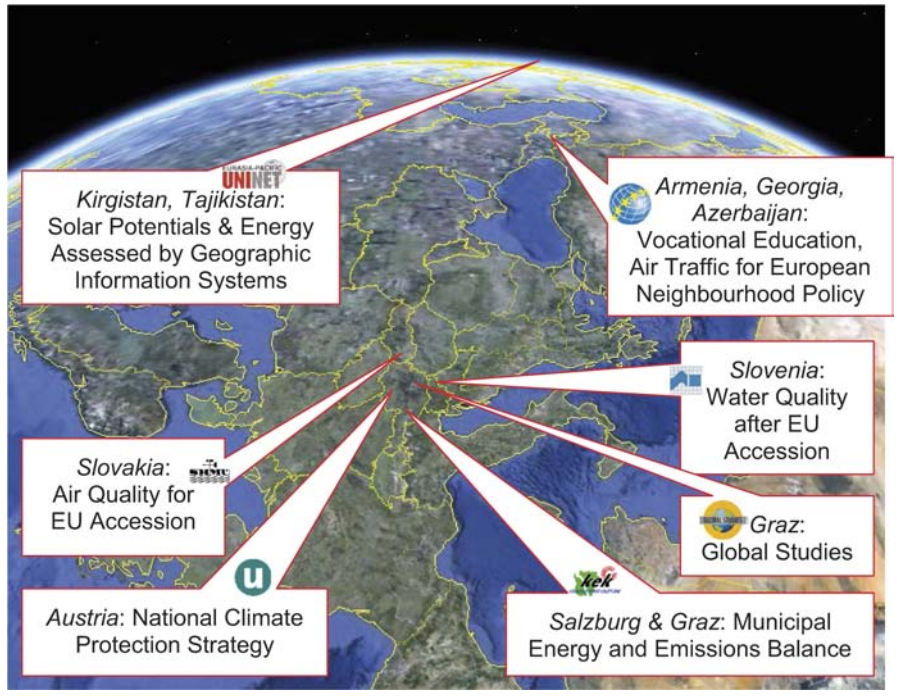


Figure 1.
Concrete workplaces ask for interculturality, interdisciplinarity and a synthesis of manifold value systems in order to match demands in a globalised world

patterns of understanding but also in a wider sense as bridging several scientific disciplines that constitute "cultures of understanding". Any partnership and collaboration between education and business needs such professional skills.

1.2 Interdisciplinarity

Since long, this term denotes the need to bridge across selective perceptions that graduates tend to adopt based on their scientific home discipline: the ecologist will think of nuclear waste and "Negawatts" when the engineer thinks of Megawatts. Situated real-life solutions for multi-stakeholder issues require perception of: technological feasibility; economic rationality; and social and environmental equilibria in order to satisfy needs for a long-lasting ("sustainable") acceptance by the population. European Union legislation has implemented most of such thinking in its "Environmental Impact Assessment Directive" that led to clear administrative procedures for large-scale infrastructure projects.

1.3 Multiple value systems: being interparadigmatic

For the global labour market, the skill to perceive and take account of various "ethical measurement systems" (i.e. values: metrics for human assessment of perceived entities) is indispensable, both in countries affected by migration, multi-ethnic or multi-religious backgrounds. Participation (ÖGUT, 2007, p. 6) is a tool to incorporate stakeholders' value systems during any planning process.

1.4 Combining all three requirements for education and training

The above three subchapters suggest that consistent and up-to-date education should promote skills to bridge:

(1) diverse patterns and cultures of understanding from which stakeholders stem;

(2) diverse lenses through which stakeholders perceive and assess issues; and

(3) diverse metrics by which stakeholders judge suitability of solutions.

Taking into account that re-framing of learners along their path enhances learning and that switching of assumed roles encourages learning, a well-designed role play (Prensky, 2001) seems to promise good results. Moreover, it strengthens entrepreneurship (Hytti *et al.*, 2010, p. 588). The following negotiation game deliberately locates learners repeatedly in situations with increasing social and academic complexity.

"Inclusion through procedural learning innovation" is suggested to include meeting the above three challenges.

2. Didactic foundation of the game "Surfing Global Change"

The didactic goal of this game is to train students to adopt a proactive and responsible professional role in building a sustainable global society. Didactic and pedagogic foundations are extensively described and reflected in published literature (Ahamer, 2004, 2006). However, only a brief overview can be presented here due to limited availability of space.

The learning goal of the entire 5-level game (see Figure 2) "Surfing Global Change" is to master the procedures of consensus building as practiced and demanded in many developed societies.

In more detail this means (compare Figure 3):

- create and organize a team (social self-organization);
- find and report scientific, technical and political information (academic research);
- identify and weigh the principal effects of a professional project (assessment);
- prepare the team's standpoint on the basis of collected material (argumentation);
- defend the team's standpoint in a discussion (implementation);
- try to create consensus between several actors based on arguments.

Students' motivation differs widely in university classes (just passing exams vs being motivated by an intrinsic interest in attaining education), separating students into idealists and pragmatists. Nonetheless, the present game sets out to integrate all of these diverse actors and reach the overall target, namely to foster skills for creating well-founded consensus at the workplace and to dissolve barriers to learning (McCracken, 2005, p. 561). The principal hope is that game-based learning motivates more students (Tunstall and Lynch, 2010, p. 625) and finally better training results can be achieved for an entire class than without a game.

The history of SGC is characterized by representing the third of three "generations of web-based teaching"; this historic genesis is reported in Ahamer (2010). E-learning adds value notably by triggering new (dialogic) didactics (Owens and Price, 2010, p. 131).

Figure 2.
Roots and shoots of SGC

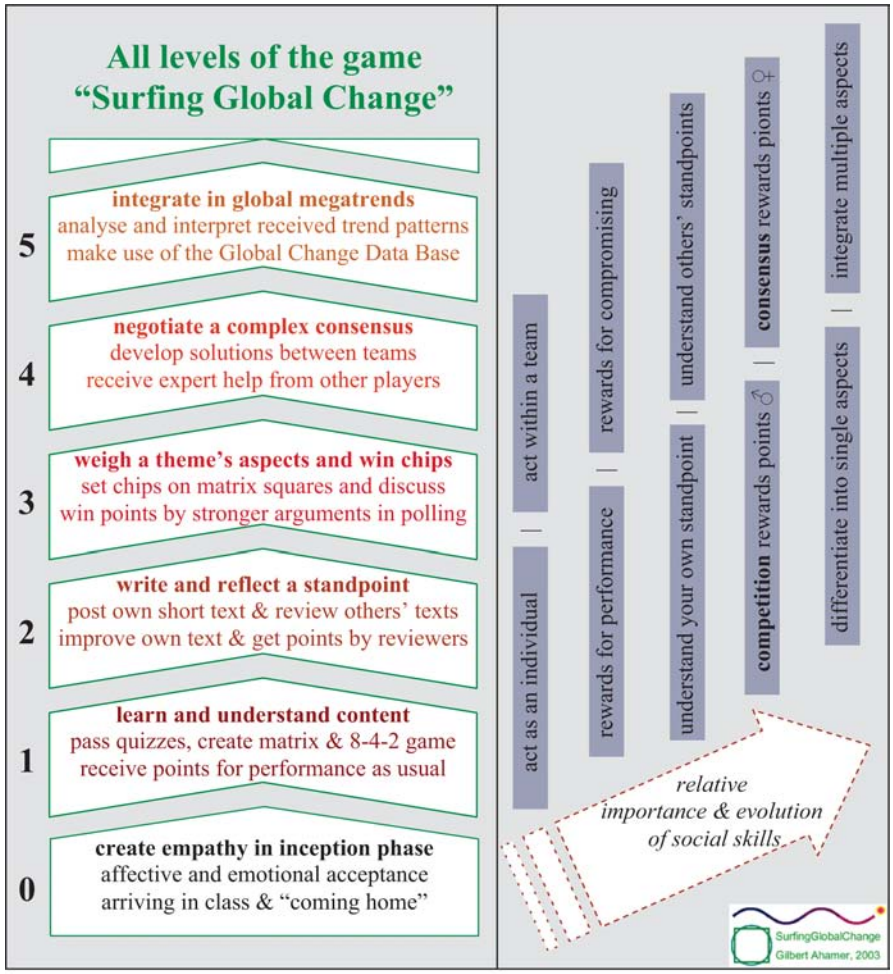


Figure 3.
Brief architecture of the entire game SGC

Notes: Five levels build upon each other. These lead to greater social and academic complexity and enhance appropriateness of the consensus constructed by the stakeholders
Source: © G. Ahamer

For the several dozen practical implementations of Surfing Global Change until now (Ahamer, 2003a,b,c; USW, 2010), both synchronous and asynchronous web-based communication was employed for usage in class as well as outside of the classroom. Among others, the following functionalities of a web platform were used (Figure 3):

- 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 for voting procedures that would define the winning team (level 3-4);
- quizzes when substantiating own decisions for a winning team (level 3-4);
- postings in discussion forums including global analyses (level 5).

3. The rules of the game "Surfing Global Change"

Experience has shown that it is helpful to acquire a sufficient level of knowledge in the first place. In many cases (e.g. "Technology Assessment", "Systems Analysis"), the students had acquired already during their preceding years of studies a level of fact-based knowledge that seemed sufficient.

Hence delivery of content in the classical sense was focused on procedural knowledge, which is believed to constitute "relevant learning" (Rogers, 1974): like for example the ten major steps in "technology assessment" processes (see Rakos *et al.*, 1988) or the characteristic techniques of "systems thinking" (see Ossimitz, 2000). Deliberately, the generation of task-centred detailed knowledge and the generation of facts are left up to the students because the process of screening available information (e.g. from the internet) is already an important step when forming opinions.

Intentionally, the inception phase (amounting to, e.g. a block of an entire day if the entire game spreads across four hours/week in a semester) was kept at a slow pace in order to allow students to familiarize themselves with the "unusual" course target, the technicalities of the web platform and its functions and the resulting necessities for engaging in intra-class communication.

The rules of SGC (the copyright of SGC rules is with the author) create border conditions (Kerres, 2000; Bork, 2001) for enhancing:

- game flow (Csikszentmihalyi, 1990) and participants' focus on the target;
- both competitive and consensus oriented performance (measured by ♀ and ♂);
- input of social energy and increase of existing motivation;
- opportunity for deploying diverse academic & social skills (Figure 4);
- academic and intellectual quality of students' written products;
- training effect for negotiation and other social abilities;
- the overall grade resulting from the points collected in the course of this game.

3.0 Inception phase (level 0): introductory course

Experience has shown that it is helpful to acquire a sufficient level of knowledge in the first place. In our case of last year's courses in "Technology Assessment" (TA), "Systems Analysis", "Environmental Technology" and "Global Change", the students had acquired during their preceding four years of studies a level of technologically oriented knowledge that was deemed sufficient in most cases. At least, it would appear difficult to increase such fact-based, technical and cognitive skills in a targeted way during the on-going course, except in a four-hours course (USW, 2010). Therefore, SGC is a game for advanced students in the final phase of their studies, who can be expected to draw on earlier achievements in several disciplines which then must only be connected with each other in the present integrative exercise.

Hence delivery of content in the classical sense is focused on procedural knowledge, which is believed to constitute "relevant learning" (Rogers, 1974): like for example the ten major steps in "technology assessment" processes (see Rakos *et al.*, 1988) or the

Note: Discussion in level 3 focuses on "Environment in EU Accession States"
Source: USW (2010)

Figure 4.
Implementation of Surfing Global Change (SGC) in a class at Graz University

characteristic forms of "systems thinking" (see Ossimitz, 2000). Deliberately, the generation of task-centred knowledge and the generation of facts are left up to the students because the process of screening available information (e.g. from the internet) is already an important step when forming opinions.

Intentionally, the inception phase (amounting to, e.g. one block of four hours) was kept at a slow pace in order to allow students to familiarize themselves with the "unusual" course target, the technicalities of the web platform (here: WebCT) and its functions and the resulting necessities for engaging in intra-class communication. Additionally, the students were also taught some fact-oriented content on matters related to environmental protection, which was the subject of one of the courses. Students were led onto a

pedagogical path where they could "rediscover" basic physical, chemical or technical insights during the course together with the trainer (Montessori, 1996).

Apart from procedural knowledge, positive sentiments related to the courses' targets were believed to be essential by the trainer, which is why enough time was devoted to foster them. For that purpose, an initial web based survey with ten questions such as "what are your expectations" was conducted. On the technical level, this "initial survey" also introduced students to the quiz environment so that they would encounter less difficulty in the exam situation later on. Students are encouraged to declare their professional and personal targets or interests also during personal communication in the course in order to motivate a decision in favour of a theme that matches students' interests.

To sum it up, the introductory phase sets out to get students acquainted with the targets of this game, its background, its procedures and technicalities and the social and procedural aims, but also to deliver basic fact-oriented knowledge to a necessary extent. This level 0 phase should create empathy among students and prepare team building.

The result of level 0 is empathy with the subject and with the targets of SGC.

The social setting is conversation and presentation over the course of some days in the classroom.

3.1 Rules for level 1: understand the content and sharpen the target

During the subsequent level 1 (or if necessary also a second time later on),

- a web based quiz is held during class that plays the role of a traditional written exam.

$$(\textit{success in the web based quiz}) = \textit{points}♂$$

Points collected there contribute roughly one third to the final grade of the individual students. Questions are formulated in a way to exclude mere reproduction of pieces of text, which serves as a means to decrease the probability of cheating.

A rather simple and common interactive game serves to sharpen perception of the factual setting of the task: a modified "8-4-2 words" game (Thiagarajan, 2001) similar to the Delphi method (Kolar, 1988) should help students to further focus on the target of the game. Three questions for definitions of key terms like "Global Change" or "sustainability" are posed, e.g.

(1) concerning the course's content and perspective ("Global Change", consensus');

(2) a target, aim or other central notion (e.g. 'sustainability'); and

(3) the chosen topic (e.g. a railway tunnel project, mobile phone antennas);

are iteratively elaborated in the following way using the web platform:

- each student anonymously posts an answer in eight words during class;
- the answers (= definitions) are read anonymously to all students and a vote is cast for the best answer including a short sentence of explaining their decision;
- the statistical result is displayed by the trainer together with all the (anonymous) explanations in order to allow for a learning effect;
- for each posting or voting action a student receives one point from the trainer;
- the same procedure as above starts with four words, then with two words;

- aim: viewing other colleagues' answers allows for re-evaluating one's own percep-tion in an undisturbed and private atmosphere without outside social pressure.

(*each posting or voting on the web platform for the* 8-4-2 *game*) = 1 *point*♂

In order to increase the students' early awareness of the problem structure,

- the future two "thematic matrices" (e.g. having the structure of a 3×4 matrix) can be designed together with the students in an iterative procedure.

The purpose of this preparatory exercise is to provide a first identification of the project's side-effects in the spirit of TA. Two matrices are necessary for playing SGC.

To sum it up, level 1 should encourage students to discern and define their area of interest as well as to sharpen the perception of the chosen topic, to differentiate the basic aspects of the intended project theme but also to process underlying fact-oriented and technical knowledge (Barrows, 2002). Substrate of web-based interaction is simple and one-dimensional definitions on the spot.

The result of level 1 is well-understood key content.

The social setting is moderate and anonymous competition during class mediated via web that has no effect on the resulting points and which lasts units of one hour.

3.2 Rules for level 2: write and reflect a standpoint

After having learned and understood basic content, students "warm up" for levels 3-4 and head for the first truly interactive and differentiated web based activity: they prepare their own standpoint based on profound research at the library, as well as researching other literature and searching the internet for one week. Individually acting students obey the following rules:

Each student selects a subject according to his/her choice within the limits defined by the trainer (e.g. single aspects of the chosen topic or other case studies) until a predefined deadline:

- each student posts under his/her name in the discussion forum a text of one page per person (trainer defines: exactly or minimum one page);
- in case students want to form groups they consequently must post a document with as many pages as there are students;
- during the rest of the course all posted texts are freely accessible: each student downloads the text document (at home or at university), reads it, comments on it and incorporates these comments into the last version making use of the functionality "track changes" which is common in programs like Word;
- the reviewing student posts the document with the comments by making use of the "reply" function in the discussion forum thus creating extra separate thread for each initial standpoint and the associated comments regardless of the time of posting;
- together with his/her listed comments the reviewer awards the author a number of points (n). The reviewer can choose between one and five points as a reward for the author's quality of work;

- in case the reviewed author decides to post an updated version of his/her text, all reviewers prior to that time receive their reward for the review (5-n) that is equal to the difference between the points granted and the maximum of five;
- all students can review each other's' work mutually, the only restriction being (in order to avoid gifts) that a reviewed person cannot review his/her reviewer; and
- additionally, the trainer reads the final versions of all papers and awards points accordingly.

This level 2 formula:

$$(\textit{reviewer's potential reward}) = 5\ \textit{points}\ ♂ - (\textit{author's reward granted by reviewer})$$

tries to introduce a momentum of game, risk and strategy into the originally merely fact-based review process, as reviewers will compromise between the colleagues' definite advantage and their own potential advantage. This formula sets out to create border conditions for optimization of text quality employing the vehicle of "striving for one's own profit".

To sum it up, level 2 should encourage students to view, compose, reflect and update a concise standpoint of their own. This activity clearly exceeds minimalist copying text fragments downloaded from the web as at this level an own statement is produced together with listing pros and cons for a limited and single thematic aspect.

The result of level 2 is one argued and substantiated standpoint per student.

The social setting is constructive criticism and moderate competition between selected partners under almost no time constraints for several weeks.

3.3 Rules for level 3: weigh aspects of a topic

After having decided on two (because one half of the class is engaged in discussion, while the other half is observing) concrete topics – e.g. projects in civil engineering – for the "core of SGC" in levels 3&4 and after the decision for a suitable matrix either by the students or the trainer:

- The students decide which role (which type of actor) they want to adopt as a team within the chosen topic, e.g.
  (1) proponent of the (building) project;
  (2) civil authority deciding on the permission to implement this project (e.g. by means of an environmental impact assessment procedure EIA);
  (3) lobby of economy and industry;
  (4) lobby of the environmentalists.
- The generation of teams is governed by the formula.

  $$(\textit{individual's points}\ ♂) = (\textit{team's points}\ ♂)/(\textit{number of team members}),$$

  therefore the team size is expected to be optimised between being very small (not enough manpower) and very large (too little share of reward).
- Each team has one team speaker for communicating decisions externally.
- Only the team speaker is nominated to the trainer, the process of team generation, constitution and definition of internal roles is left to the students.

- Team leaders have the right to expulse members (e.g. if not collaborating).
- The students have one week to prepare common and shared standpoints in teams (two pages/person) on the topic that was agreed on beforehand.
- After one week the (mostly four) teams post their standpoint in form of a consistent and balanced document on the web platform.
- On the day of the level 3 game, all individual teams are asked to sit at their tables in the centre of the class room (inner part of Figure 5) and they are given a sheet of paper with the matrix (e.g. 3 × 3, showing headings for rows and columns as well as definitions for each matrix square similar to Table I).
- As outlined in Figure 6, for 15 minutes preparation time each team has to place (best a total of 60 for an envisaged length of discussion of two times two-and-a-half hours) chips into 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.

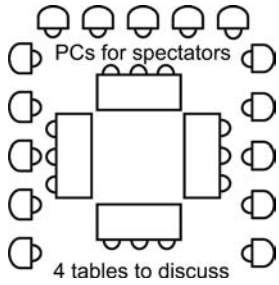


Figure 5.
Suitable classroom

New university campus (sum = 100 points)	Economic	Environmental	Infrastructure
City population and neighbours		20	
Students	5		10
The university operators	10	15	

Note: Text describing the meaning of each single matrix element in detail is not included here

Table I.
An example for a matrix filled in by a team

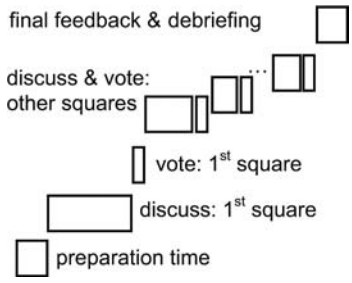


Figure 6.
Time plan for level 3 discussions

- This preparation time is designed to further foster the teams and their internal roles: it is recommended to define internal roles, e.g. one responsible speaker per matrix element.
- The rule for the level 3 discussions is as follows: the trainer (or supporting software) randomly selects one matrix square after the other and looks, which teams have placed chips.
- Only teams having placed chips discuss the respective subject within the allotted discussion time (if appropriate with 10 min. as a minimum).

$$(\textit{time in minutes}) = (\textit{sum of chips placed on this square})/(\textit{number of involved teams})$$

- The remaining teams at the tables not having placed chips *plus* the students belonging to the other subject (spectators in the outer part of Figure 5) form the public with a right to vote (directly by raising hands or also via the platform).
- Optionally a jury (e.g. of external experts or selected students or the trainer himself/herself) is present in the room.
- The trainer marks start and end of the discussion (e.g. with an alarm clock or an internet based software) but refrains from completely participating in the content or procedure.
- After the end of the discussion the "public" has the following options for voting:
  (1) each single participating team won the discussion;
  (2) no team won the discussion (e.g. only seemingly a consensus).
- In case (1) only the winning team receives the reward according to the following formula, in case (2) no team.

$$(\textit{potential team's points } ♂) = (\textit{sum of chips placed on this square})$$

- The voting public may give a reason for their decision, but they need not do so and they receive one point for each posted reason.
- Criteria for polling are:
  - quality and clarity of academic argumentation;
  - quality of communication of arguments;
  - discipline in discussion;
  - ability to perceive and understand other teams' arguments.
- The trainer or the software keeps record of all teams' point score throughout the game.
- 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.
- In a simplified form this level 3 could be used as a web-supported game.

To sum it up, we see an atmosphere of competition in level 3 which heads towards an argumentative battle between standpoints (compare Naidu *et al.*, 2003). Different standpoints are induced and personalized by different teams playing different societal roles. The main interest of the teams is to win or else to reach a consensus. Moments of play or even gambling are introduced by putting at stake the relative weight of aspects (= matrix elements). Possibly realistic democratic (or even Machiavellist) effects are generated by a rather decisive voting procedure.

The results of level 3 are decisions between standpoints.

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

3.4 Rules for level 4: negotiate a complex project

After having differentiated the complex topic into its aspects by means of the matrix and after having collected and weighed the arguments during the competitive discussion, the next task is to integrate these diverse views into a balanced compromise that can serve as a solution and that is accepted by the stakeholders.

From level 4 on the points (♂) are replaced by pionts' (♀) according to Figure 3.

- The same teams as in level 3 prepare a proposal for a common solution for the topic's project during one week.
- Each team speaker posts this proposal on the platform one day before the level 4 discussion event takes place.
- On the last day all team members study through the other teams' proposals critically with a view for enabling solutions to existing obstacles.
- In class, all teams sit around a table and have to agree on a solution (= seve-ral items written down) after a period of one hour of self-organized discussion.
- The text of the consensus must be posted and agreed on by all team speakers.
- Each team makes use of "external experts" (must be at least one expert, may be more) who is hired on a "free market of knowledge" and acts as follows:
  - each team in need of expert advice publicly writes (e.g. on the blackboard) the concrete question or the field for which assistance is needed together with the number of points the team is willing to award for successful advice;
  - the team selects an expert from the persons responding to the call;
  - the chosen expert sits with the team during the discussion; and
  - ultimately, a player might be recruited as expert by a competing team.

(*entire team attributes points for expert assistance* ♂)

→ (*successful expert receives pionts* ♀)

- A total of 60 points is at stake and will be awarded to each team after a final polling round with only two options to vote for the present spectators (= roughly the other half of the class having chosen the other topic):
  - thumbs up: a real and profound consensus was found between all teams; and
  - thumbs down: no such consensus was reached between all teams.

- Each voting student receives one piont when posting a reason for the decision.
- The entire process of level 4 and hence the involved work of an expert is defined as successful if the majority of votes is "yes".

$$(\textit{potential team's pionts} \ ♀) = (\textit{total of } 60 \textit{ points available})$$

To sum it up, an atmosphere of co-operation and consensus (which is substantially different from "compromise") predominates in level 4. The different standpoints are integrated into one coherent view and merged into an acceptable solution that is beneficial to the common good (which is modelled by the subgroup of present stakeholders).

The results of level 4 are integrated adverse standpoints.

The social setting is calm consensus and co-operation. Different aspects of a complex topic are personalized by different (physically discernable) actors in class.

3.5 Rules for level 5: recognize and interpret complex megatrends

After having learned to integrate adverse standpoints that are physically visible as different teams on tables and that defend their own importance by argumentation, gamers are led to the next step. Individuals or freely aggregated groups of students should be able to arrive at different solutions for one and the same problem by themselves and should train to view a complex matter from different angles.

For that purpose, students are asked to interpret complex reality as measured by global long-term trends which are taken from the author's "Global Change Data Base" (GCBD, example in Figure 7. and see Ahamer, 2001). This interdisciplinary database shows data for the past three decades for practically all countries of the world for variables in the fields of economy, energy, population, land use, agriculture and forestry, human development indicators and social indicators. By means of regression analyses, the "analytical tool of the GCDB" provides graphically oriented as well as quantitative output which serves as a starting point for interpretations that weigh out intervening factors and which could explain recent global techno-socio-economic history for representative world regions.

The trainer assesses the depth and clarity of these analyses, hence

$$(\textit{team's pionts} \ ♀) = (\textit{reward given by the trainer for the quality of the analysis})$$

An additional tool for establishing and visualizing the system's interrelations and for drawing up a small quantitative explanation model could be the tool "Stella" by HPS (2003) which has a user-friendly profile facilitated by its graphical interface.

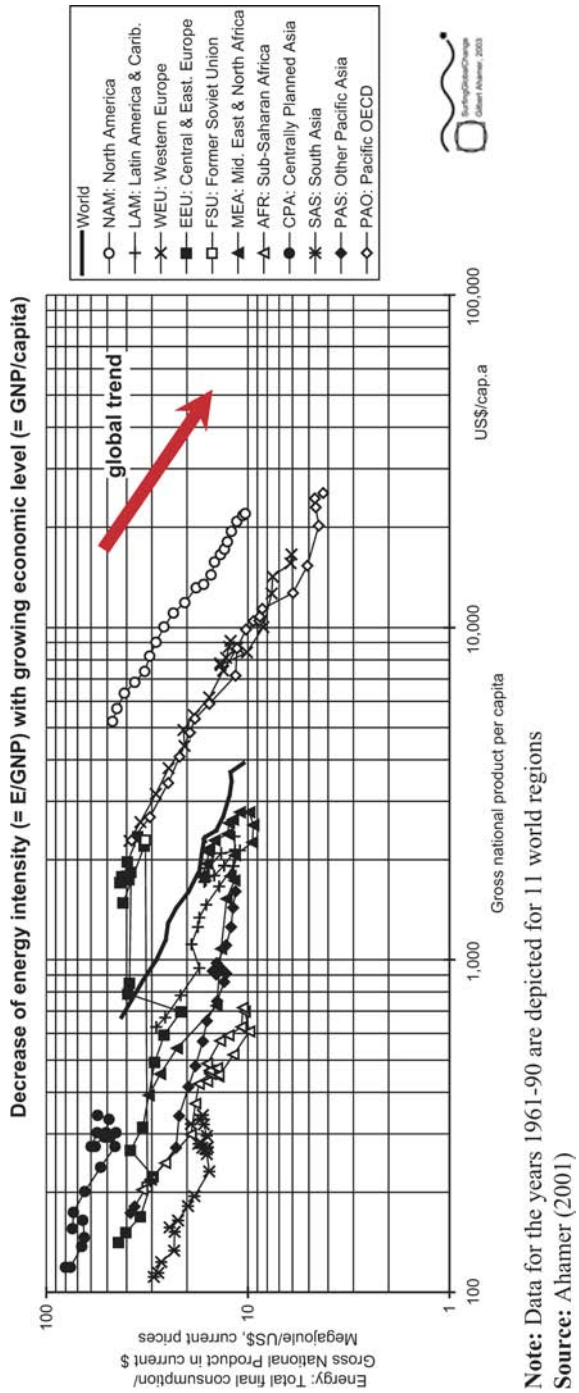
To sum it up, a self-guided integrative (global) view is the target of level 5.

The results of level 5 are analytical texts in which main effects and side effects are valued as such and properly assessed in their effect on reality.

The social setting is focused and consistent work (individually or in teams) where the more active experiences of preceding levels are reflected, generalized and where the social energy of the class calmly phases out.

4. The social procedures in the five levels of SGC

SGC sets out to allow for standpoints to evolve organically (Figure 8) along five levels and foster self-directed learning (van Gelderen, 2010, pp. 713-714) as follows:



Note: Data for the years 1961-90 are depicted for 11 world regions
Source: Ahamer (2001)

Figure 7.
Sample GCDB output: a correlation between growing energy efficiency (= E/GDP) when economic level increases

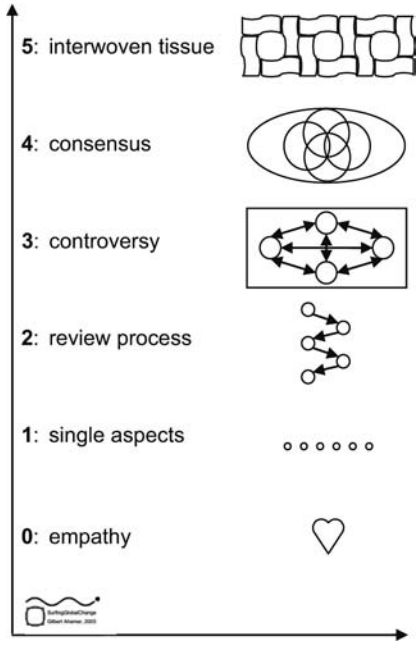


Figure 8.
Symbolic depiction of the social and communicative setting, in which the five phases of SGC are developing: the evolution from dwelling upon individual technical details towards a coherent or even holistic view

(1) Small isolated packages of traditional content stemming from single disci-plines, representing only one side.

(2) A process of text-oriented criticism at a slow pace permitting deliberation on a one-to-one basis (Sivan, 2000, Ronteltap and Eurelings, 2002; Kern *et al.*, 2003; Moreira and da Silva, 2003) 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 many-to-many basis inside a team in synchronous real-time communication (Reilly, 2003; Schwartz and Teach, 2002; Salter, 2003, Swan, 2002).

(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 in synchronous real-time communication (Klabbers, 2003; Kirk, 2004).

(5) A closing activity of creating a view integrating the many standpoints heard until now by creating an analysis outside severe time restrictions on an individual or freely chosen team we-just-for-us basis in web mediated asynchronous communication (Myers, 1999; Meadows, 2001; Blewitt, 2010, p. 483).

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

May Surfing Global Change enhance sustainable development!

5. Which education and training for employment in the long term?

In the following sections we will interpret experiences with using "Surfing Global Change" (SGC) for eight years in a classroom setting.

Clearly, short-term professional training has to follow short-term needs of the human resources market in many cases. Additionally, long-term requirements can be deduced from the overall civilizational evolution that promises to focus on communication skills needed for understanding diverse world concepts.

Ultimately, consciousness stems from reflection. Learners could reflect (Figures 9 and 10):

- themselves (their living culture), in Greek "know yourself" is *γνωθι σαυτον*;
- their views of realities (their disciplines (Werlen, 2010, pp. 187-192);
- the value systems against which they check and assess perceived realities.

In this sense, interculturality, interdisciplinarity and multiple value systems are three consecutive substrates of reflection (Ahamer *et al.*, 2011, p. 17, Harvey, 1996, p. 10).

From Figure 9 and Figure 10 we see that our process of understanding expands by reflecting and understanding other individuals, others' views and others' values. Contemporary education should include and focus on such skills, wherever possible. Too often, the gravitational centre of our worldview is founded on the history books we

Table II.
Tab 2 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

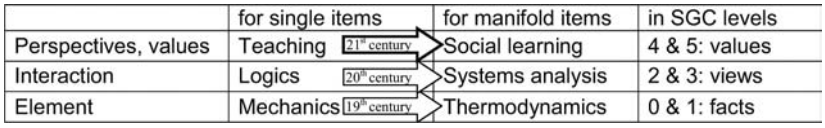


Figure 9.
Consciousness grows through reflection: the principal evolution of science along past centuries (left) correlates to the architecture of SGC (right)

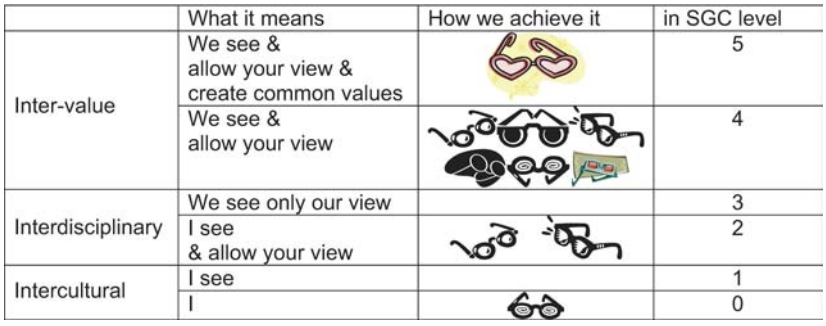


Figure 10.
Six tasks for education and training and their implementation in SGC

engaged in back in our school days that might however not always have been "globalized" enough in their interculturality.

In this paper, the basic entity of thinking will no longer be "facts" but rather "interactions" and "perspectives". Such a paradigmatic shift leads us to Figure 11 that symbolically shows a "geography of perspectives": stakeholders in real-world projects have their own views on issues that might often be difficult to reconcile (Castells and Arsenault, 2006).

According to the concepts of the frequently cited theoretician of the "network society", Manuel Castells (2001), who spoke of "space of places versus space of flows", this article perceives an analogy: the common "geography of places" (Figure 1) is complemented by a "geography of flows, views, perspectives, interrelationships".

Figure 11 tries to concretely depict such a "geography of perspectives" that deals with diverse views on reality occurring during real-world work projects and that are fuelled by often conflicting views. Modern information and communication technologies (ICT) shrink space and lead to a collapse of geographical distance (Gebhardt *et al.*, 2007, p. 591); this was diagnosed as "time-space compression" by geographer David Harvey (1990, p. 260). At the same time, however, cultures of understanding do not seem to converge at the same speed (Tibi, 2009), among others in the geographic area of Figure 11 characterized by three world religions. Relief should be sought in this situation and training should be provided.

Source: map: Google Earth; logos from Ahamer *et al.* (2011, p. 17)

Figure 11.
A "Geography of perspectives" is suggested according to Manuel Castell's "space of flows": basic entities are no longer places but perspectives and views

The present article consequently suggests training for bridging mindsets of understanding because such often conflicting mindsets appear as bottleneck for future concrete economic co-operation that is well underway (ENP, 2010). Such an ability to act across mindsets may take the form of intercultural, interdisciplinary and inter-value dialogue, e.g. embodied by the master's curriculum "Global Studies" (2010). The contributions depicted in Figure 1 stand for deepening and reviving a cultural dialogue of understanding, produced as a "collateral benefit" of concrete technical and economic projects. To implement such a dialogue, especially social and instructional innovations are much needed (types (Hardaker and Smith, 2002, p. 345; Hardaker and Sabki, 2010; Surry and Ensminger, 2002).

Another helpful key of interpretation unexpectedly comes from "the science of design". During learning, it is important to iteratively "switch from problem space to solution space" (Dorst and Cross, 2001, p. 434; Maher and Tang, 2003; Ahamer and Strobl, 2010, p. 2). In our case this means to switch from a "space of facts" to a "space of world views" as conceptualised by the project partners.

The philosophies of constructivism (Kerres and de Witt, 2002), pragmatism (Rescher, 2004, p. 44; Dewey, 1995; Shaker, 2002, p. 6) and action research (Werlen, 2010, p. 160, p. 241; Gebhardt *et al.*, p. 595) are compatible with the strategic design of SGC, namely to design a social process for consensus building.

6. Practical implementations of "Surfing Global Change" to date

In classrooms all over Austria, more than two-dozen SGC implementations have covered the following themes until now, all of which show a multi-stakeholder structure:

- Climate Change and Climate Models.
- Technology Assessment.
- Systems Analysis and Biology.
- Environmental Effects of Land use and Energy Supply.
- Global Change – Socio-ecologic Competencies for new EU Member States.
- Participation in Municipal Sustainability Planning.
- Global Change in our Networked Environment.
- Changing World? – Comparison of Three Socio-economic, Climatic and Technological Future Perspectives.
- Passive Houses and Low Energy Houses.
- A Climate to Act.
- Futurology.
- Peak Oil.
- Environment in South-East Europe and EU Enlargement.
- Technology Assessment and Climate Change.
- Energy Optimization in the Residential Sector.
- Environmental Impact Assessment and Strategic Environmental Assessment.
- S7 - Pros and Cons of the Fürstenfeld Highway to Hungary.

- Globalization from Chernobyl to the Styrian 380 kV Line.
- Ecological Way of Life: Nostalgic Past or Necessary Future?
- Viticulture in Southern Styria under Impact of Climate Change.
- Go East: Environmental Aspects in Croatia and Slovenia.
- Inner-Alpine Highway Along the Enns River: Now or Never.
- Heating Ecologically and Economically: Comparing Methods.

These themes have been implemented with SGC at several universities since 2003 and many of them were documented in student reports (USW, 2010). Students gave positive feedback during class, via the web platform and via the university-wide feedback function. A most useful environment is the new "Global Studies" curriculum developed at Graz University over the last few years (Ahamer *et al.*, 2011, p. 27).

7. Conclusion: bridging multicultural geographies of perspectives

The title of this paper pinpoints the necessity for multicultural education for real-world projects to bridge so-called "geographies of perspectives" of stakeholders. This means to bridge mindsets of diverse worldviews that were symbolically mapped in Figure 11.

For such an aim, a concrete didactic procedure is proposed that shall be used in secondary and tertiary formation: the web-supported negotiation game "Surfing Global Change" (SGC) enables and enhances a process of achieving a 360° view of complex inter-disciplinary, intercultural realities including diverse value systems of stakeholders. SGC uses the tradition of game-based learning and situated, problem-based learning enhanced by asynchronous and synchronous web-based communication.

The present paper represents the official set of game rules of this original game invented, copyrighted and implemented by the author.

Didactics of SGC is grounded in active, self-organized, self-directed learning, training of the capacity to act and self-motivated responsibility for both practicable and sustainable solutions for the future global society.

The pedagogic outlay of SGC aims at weighing out competition vs. consensus, self-study vs. team work, sharpening one's own standpoint vs. readiness to compromise, differentiation into details vs. integration into a whole and hence seeks to mirror professional realities. In this spirit, the architecture of SGC provides a framework for "game-based learning" along five interactive game levels:

(1) learn content and pass quizzes;

(2) write and reflect about 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 analysing global long-term trends.

This set of game rules forms a boundary condition for expected processes of social self-organization. Motivation to earn good grades (resulting from collected rewards) determines team size, work attitude and individuals' tendency to stick to their own convictions when substantiating consensus. SGC's rules trigger two distinct processes:

social dynamics among peer students in class and their individual strife for good grades. These two goals provide useful tension during game play.

Since 2003, this web-based negotiation game has been implemented more than two dozen times and received positive feedback from students and co-teaching experts.

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Gilbert Ahamer tries to build bridges between scientific disciplines (studies finished in technical physics; environmental protection; economics, business administration and law; on-going in geographic information sciences) and between cultures where professional requirements and his own sense of adventure have brought him (France, Italy, Balkans, Near East, Caucasus and Central Asia). Such bridging efforts went along with frequent re-institutionalisation (International Institute for Applied Systems Analysis, Austrian Federal Environment Agency, Austrian Academy of Sciences, teaching at five universities, working for European Union Enlargement and EU Neighbourhood Policy). His own value systems were planned to be well-rooted but found themselves continuously subject to challenge and adaptation. His interim (and possibly final) result of lived experiences is: "keep a professional and high-quality dialogue going!" Gilbert Ahamer can be contacted at: gilbert.ahamer@oeaw.ac.at