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APPROACHES TO SUSTAINABILITY
EXAMPLES FROM GEOGRAPHY TEXTBOOK ANALYSIS IN GERMANY

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Abstract
Education for Sustainable Development is a key concept in Geography instruction in Germany. The present contribution investigates how this concept is conveyed in Geography textbooks. Methods used include both quantitative and qualitative analysis as well as meta-level analysis. The quantitative investigation of 28 school textbooks revealed that sustainability, sustainable development und "sustainable" as a modifier (for example, sustainable tourism) are only rarely mentioned. By contrast, numerous examples can be found that include the topic of sustainability without explicitly stating the term. Seven topical fields (examples include tropical rainforest, renewable raw materials, the city of tomorrow) are used to illustrate various solutions ranging from simply doing without up to sophisticated technical solutions. In these examples, sustainability is often equated with environmental education, the aspects of economics and society are dealt with to a lesser extent. The contribution closes with the call for a new system of values, which no longer uses economic growth as the primary indicator of the quality of life.

Keywords: *textbook analysis, sustainability, environmental education, doing without, technical solutions*

1. THE FRAMEWORK FOR TEXTBOOK AUTHORS

Education for Sustainable Development (ESD) is a key concept in Geography instruction in Germany. On the international level, it is based on official statements such as those made by UNESCO. They incorporate the three parameters ecology, economy and society (Source: UNESCO and Sustainable Development. 2005. p. 5. http://unesdoc.unesco.org/images/0013/001393/139369e.pdf, accessed 2010-4-26). The Lucerne Declaration on Geographical Education for Sustainable Development stated criteria to be used in geography education for sustainable development (Haubrich, Reinfried, Schleicher 2007).

On the national level, the "Conference of the Ministers of Education and Cultural Affairs of the Federal States in the Federal Republic of Germany" (KMK) gives recommendations that should be implemented in the curricula issued by the individual federal states: "The concept of Education for Sustainable Development has the objective of enabling students to actively shape an ecologically acceptable, economically strong and socially just environment under consideration of global aspects, basic democratic principles, and cultural diversity."

(Source: Empfehlung der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (KMK) und der Deutschen UNESCO-Kommission (DUK) vom 15.06.2007 zur „Bildung für nachhaltige Entwicklung in der Schule“. http://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2007/2007_06_15-Bildung-nachhaltige-Entwicklung.pdf, accessed 2010-4-26).

In Germany each federal state is responsible for its curricula. These curricula constitute the contextual guidelines for the content of textbooks. This is illustrated using the curriculum for North Rhine-Westphalia: Students are to make a contribution “so that preservation of the natural living conditions for subsequent generations is ensured through socially, economically and ecologically responsible actions.” (Source: Kernlehrplan für das Gymnasium – Sekundarstufe I (G8) in Nordrhein-Westfalen, Erdkunde. 2007. p. 15. http://www.ritterbach.de/lp_online/3408g8.pdf, accessed 2010-4-26). Wording used in the curricula of the other federal states is of a similarly general nature.

By virtue of these stipulations, the freedom of textbook authors to select topics and examples is relatively broad.

2. METHODS OF TEXTBOOK ANALYSIS

A total of 28 textbooks for grades 1 - 11 (grades 5-11 for *Gymnasium* (academic high school)) were evaluated. These textbooks are currently used in the federal states of Bavaria, Lower Saxony, North Rhine-Westphalia and Saxony.

These textbooks were investigated using the following methods that have been applied by numerous authors (e.g., Bednarz/Bednarz/Petersen 2006, Bullinger et al. 2005, Hamann 2004, Manik 2008, Marsden 2001, Mayring 2008, Mikk 2000, Pingel 1999, Weinbrenner 1995).

2.1 Quantitative Analysis

A keyword analysis and a manual check were performed to determine whether the concepts “Nachhaltigkeit” (sustainability), “nachhaltige Entwicklung” (sustainable development) and the adjective “nachhaltig” (sustainable) are used in the glossary. If this was the case, the number of occurrences of these concepts in texts, figures/illustrations as well as map captions was counted.

Tallies were also made of how often texts dealt with the field of terms pertaining to sustainability. Examples include “sustainable tourism” or “renewable energy”.

2.2 Qualitative Analysis

Two qualitative methods were used here. On the one hand, topics that explicitly used the terms “sustainability” or “sustainable development” were analyzed (e.g., tropical rainforest). Then the investigation was expanded to include the entire field of concepts pertaining to “sustainable development”. In this case, it was difficult to draw a clear distinction to instruction that strictly deals with environmental education. A certain degree of subjectivity was thus unavoidable when selecting examples. To ensure the legitimacy of the selections made, the results of discussions in geography education and general pedagogy were also included (e.g., de Haan 2007; Bahr 2007; Schnauss 2007; Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung und Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland 2007; Lexikon der Nachhaltigkeit 2010; Haubrich, Reinfried, Schleicher 2007).

2.3 Meta-level Analysis

On the *real level*, examples of textbook material that made clear literal or figurative/graphic statements were recorded, additionally indirect meta-level statements were evaluated. The

comprehensive meaning can only become evident after describing how all elements of the real level are linked to the associated meta-level elements. The specific content of instructional material becomes more evident when one also "reads between the lines" or takes a look "behind the scenes". This does increase the level of subjectivity involved, such as in cases where the interpretation process can be influenced by previously-acquired everyday and theoretical knowledge (cf. Rolfes 2002). It must be noted, however, that subjectivity cannot be ruled out in the case of "standardized" methods either (Hamann 2004, 17). Consequences only become evident when meta-level aspects are considered that are not clear when performing analysis of content based exclusively on text and images.

Because the objective here is to present how education for sustainable development is implemented in German school textbooks, description is unavoidably dominant. Results are nevertheless commented upon in a critical manner.

3. RESULTS OF THE ANALYSIS

3.1 Quantitative Results

The results of a quantitative investigation are:

5x "sustainability"	is stated as a term for a concept
9x "sustainable development"	is stated as a term for a process
8x "sustainable"	is used as a modifier, for example, "sustainable forest protection", "sustainable tourism".
162x "sustainability"	is not explicitly stated per se, however the topic "sustainability" is involved. Such examples include "conserve water", "renewable energy", "ships under cheap flags"

These results indicate that the terms "sustainability" and "sustainable development" are not mentioned often. The same applies to concretely formulated topics such as "sustainable forestry" or "sustainable tourism". If one were to restrict oneself entirely to numeric data on explicit occurrences of the terms "sustainability", "sustainable development" and "sustainable" as a modifier, the result would be that topic of sustainability is hardly dealt with at all, despite curriculum requirements. For this reason, the investigation was expanded to such an extent that topics are included that in terms of their content pertain to sustainability, e.g., topics such as "ships under cheap flags", because of their potential for catastrophe on the seas of the world.

If mentioned, the term "sustainability" and its variations were primarily addressed in grades 10 and 11. Topics that did not explicitly mention "sustainability" but were related to it can be found in all grades.

3.2 Qualitative Results

The analysis revealed that restriction to the terms of sustainability, etc. only identifies part of the essential content. Sustainability is addressed and dealt with in additional topics as well. For example, sustainability is illustrated in examples of the everyday life of students (e.g., adopt-a-creek-programs, preferred leisure activities). Here the focus is on hands-on activities that convey the understanding and skills required for ecologically-responsible actions. Furthermore, scenarios of the future are drafted (for example, living in the city of tomorrow). One key topical field includes technical solutions for securing a sustainable future (e.g., utilization of renewable raw materials). Global implications are often illustrated using the example of the tropical rainforest, because it can be stated that clearing large areas of the tropical rainforest has a global impact on climate. Finally, evaluation of models is also performed to instill a desire in students to act in a manner that is responsible and sustainable. One example of this is the consideration of the ecological footprint.

3.3 Meta-level Analysis Results

If one analyzes the topics pertaining to sustainability that are dealt with in German school textbooks, it becomes evident that the focus lies in the field of ecology. This approach is thus essentially a continuation of environmental education that the student is already familiar with. In the process, social shifts that pertain to changes in behavior and utilization of new technologies are addressed indirectly. Topics seldom consider the economic implications of sustainability.

The drastic call for achieving sustainable development demands a radical change in individual actions, above all doing without. The example of the ecological footprint employs frightening scenarios, because it clearly illustrates that current utilization of resources already exceeds the Earth's capacity. One legitimate question in this context would be why the student should even bother to change behavior (in the light of a growing world population and increasing global prosperity). Other depictions show that moderate changes in behavior are sufficient and are achievable without major impact on lifestyle, for example in the case of winter sports. On a global level, it is evident that people in the tropical rainforests are denied large-scale economic development—even the topic of sustainable forestry is only sketched vaguely. Further examples illustrate how all people in developing and industrialized countries alike can achieve sustainability through implementation of new technologies. Such examples range from the utilization of alternative raw materials to renewable sources of energy. By so doing, it is made clear to the student that positive developments are definitely possible that do not require radically changing one's lifestyle. The fact that doing without where this is expedient does not necessarily have a negative impact on the quality of life is presented using the example of life in a city of tomorrow.

4. EXAMPLES FROM GEOGRAPHY TEXTBOOK ANALYSIS

In the following, selected topical fields are presented to illustrate how the concept of ESD has been realized in textbooks.

4.1 Exploration of the Environment

One key objective of ESD is to instill a reverence for the environment through concrete experience. In an example taken from a grade 4 primary school textbook, the students explore a creek. In a hands-on manner they identify plants and animals, investigate the water in terms of purity, and draw a map of the creek. Together with parents, trees and bushes are planted. Students learn rules of behavior that permit respectful encounters with nature, for example, do not thoughtlessly uproot plants, move carefully so as to not frighten animals. (Heimat- und Sachunterricht 4. 2004. GS Bayern, Jo-Jo, p. 53).

4.2 Tropical Rainforest and Sustainability

The topic "tropical rainforest" is dealt with in numerous textbooks. A caricature, used in several of them, depicts a huge tree that symbolizes the tropical rainforest in its immense diversity. The roots of this tree, which take the form of a human hand, hold a symbolic globe. A logger, armed with a chainsaw, is seated on this globe and is in the process of felling the huge tree. The caricature suggests that utilizing tropical rainforests is equivalent to destroying the world. (Diercke Geographie 9. 2006. GY Sachsen, p. 79, M5). The text beside the caricature states two possibilities for dealing with the tropical rainforest:

In example 1, the rainforest is fully protected. A German initiative collected money for purchasing parcels of land. In example 2 the rainforest can be used extensively. A German automaker buys coconut fiber from farmers, but only if the coconut palms are planted in such a way that giant trees in the forest are not cut down. (Diercke Geographie 9. 2006. GY

Sachsen, p. 79, M7). In another textbook, extensive utilization is referred to as "ecologically adapted agriculture", namely "mixed agriculture with mulching" (TERRA Geographie 11. 2009. GY Bayern, pp. 55, Fig. 27). In such cases, numerous tropical rainforest trees remain standing while only small-scale fields are created.

The statements made here are that use by intensive forestry is not possible in a tropical rainforest. It is, however, interesting to note that the concept of sustainability was first used in forestry in Germany (Source: Lexikon der Nachhaltigkeit. Hans Carl von Carlowitz. http://www.nachhaltigkeit.info/artikel/hans_carl_von_carlowitz_1713_1393.htm, accessed 2011-2-5).

An example from Finland illustrates to what extent sustainable forestry can be pursued. Even though wood is used industrially as "green gold", wood resources in Finnish forests have increased by about 25% in recent years thanks to "responsible use of nature" (Seydlitz 5/6. 2008. GY Niedersachsen, p. 178). While it is claimed that sustainable utilization is being practiced in industrialized countries, there is apparently a desire to forbid people in the tropical rainforest to practice it or to only permit them to practice extensive utilization.

4.3 Tourism and Sustainability

Sustainability is made relevant to the student's everyday life using the example of tourism. The Alps are a recreational region with mass tourism and tourism is an important economic factor. The keyword "sustainable tourism" calls for "bring[ing] economic, cultural, and ecological concerns in a sound and harmonious manner" (TERRA Geographie 11. 2009. GY Bayern, p. 132). Concrete measures are presented on things an individual can do to protect mountain regions: e.g., using public transportation instead of cars, doing cross-country skiing or going hiking instead of downhill skiing. To some extent, reality differs from this: many school classes in Bavaria go to the Alps to learn downhill skiing! Added to the text are logos of initiatives for "ecological tourism" such as "ECO friends" and "Friends of Nature International". (TERRA Geographie 11. 2009. GY Bayern, p. 133). It is clearly evident that numerous efforts are being made to implement sustainable tourism but it is ultimately up to the individual to determine the extent to which he or she is willing to or is able to act in a sustainable manner.

4.4 Renewable Raw Materials and Sustainability

One problem associated with fossil forms of energy is their finiteness. Renewable raw materials therefore contribute to sustainable development, both in terms of maintaining the standard of living of the current generation as well as leaving resources for future generations.

Interestingly, one textbook shows that the utilization of renewable raw materials is a controversial issue, it clearly offers the potential for conflict. The given example of producing fuel from biomass illustrates positive aspects such as a neutral CO_2 balance, the substitution of fossil energies, the creation of jobs and reduction of foreign currency transactions. Negative aspects such as clear-cutting of tropical rainforest areas are presented. Another negative aspect of using renewable "raw materials" which is mentioned are increased food prices when corn is used as the basis for producing automotive fuel. The controversial points of view, when placed side by side, require the student to create his/her own opinion (TERRA Geographie 11. 2009. GY Bayern, p. 120-121). This example indicates that instruction does not only present "off the shelf" solutions to students, but rather calls on students to critically debate economic and governmental policy decisions on the utilization of energy.

4.5 Technical Solutions for Ensuring Sustainability

Various textbooks offer technical solutions in terms of renewable energy. They imply trust in the capabilities of human ingenuity. In one textbook, the illustration of "possible elements of a sustainable energy economy" (Seydlitz/Diercke Geographie 11. 2009. GY Bayern, p. 123,

Fig. 4) includes renewable forms of energy hydropower, wind energy, solar energy, geothermal and energy captured from tidal flows and ocean currents. Numerous possibilities are listed for solar energy, these range from generating heat and electric power in residential areas to large-scale industrial plants such as the solar chimney power plant, solar tower power plant, and parabolic trough solar collector power plant but neglect to mention availability and reliability of supply. The illustration also contains other technical means for power generation such as how energy can be captured from renewable raw materials produced by agriculture (reed, rapeseed). Finally, the solar dish plant as a means for decentralized power generation is presented (Seydlitz/Diercke Geographie 11. 2009. GY Bayern, p. 123, Fig. 4). Despite the various technical advances, the textbook soberly states that for the supply of electric power on a global scale, the currently-known regenerative alternatives will only play a minor role for the time being, because the power density of fossil fuels is to date considerably higher. Moreover, it critically notes that–in the case of these technical solutions–there are still problems with the transport and the storage of energy which are yet to be resolved (Seydlitz/Diercke Geographie 11. 2009. GY Bayern, p. 122). The textbook thus presents a situation to the student who should then critically reflect before taking a stand on this issue.

In one textbook, it is pointed out to the student that the utilization potential of renewable energy varies from one region to another. A map clearly shows that utilization of wind energy is most expedient in coastal regions. The student is then able to decide for himself/herself whether it makes sense to operate wind energy plants in the region where he or she lives (Mensch und Raum 5/6. 2008. GY Nordrhein-Westfalen, p. 117, M4). (In Germany, wind energy plants are now being installed everywhere. This is due to the fact that attractive subsidies/tax incentives are offered. Cf. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit. Nationale Klimapolitik. 2007. http://www.bmu.de/klimaschutz/nationale_klimapolitik/doc/39913.php, accessed 2011-2-5).

Through their mere existence, however, these alternative concepts for solving energy problems suggest that creativity is being directed toward practicable solutions for preserving a world that is worth living in.

4.6 Sustainable Development—Basics and Objectives

A few textbooks also offer a theoretical basis for the concept of sustainable development. One such example is presented in a textbook for grade 10. First the internationally-accepted definitions and objectives are stated (Report of the World Commission on Environment and Development: *Our Common Future*, 1987; World Summits in Rio 1992 and Johannesburg 2002; Millennium Development Goals 2000). Then it is shown that the three parameters, ecology, economy, and society are equal in value and influence each other reciprocally. In the text used in this classroom lesson, however, ecology is in the foreground. The topics covered are ecological consumption, preservation of nature and the climate. Even emotional aspects such as enjoying nature are touched upon (Seydlitz Geographie 10. 2008. GY Bayern, pp. 164-165).

After informing students about the fundamentals and objectives in the first lesson of this topic, the next lesson focuses on the consequences that the individual is to draw. The example of the ecological footprint is used in this case. A drawing makes it clear that the ecological footprint is larger than the Earth. It is assumed by definition that the footprint relates to an area required for sustaining today's standard of living. The implication is, if this drawing were true, the downfall of mankind would be unavoidable. This example shows that some concepts are used that imply frightening scenarios. However, the concept of the ecological footprint does not consider future scientific advances. One could, for example, calculate how much paper would be required to provide all of the world's students with the all the books required for school (textbooks, non-fiction books, reference books). The result would be that all of the world's forests collectively would not be sufficient for producing this much paper. Today,

modern Internet technologies are available to nearly everyone not only as a source of extensive reference information in all fields, in addition, content is continually updated. Consumption of paper is thus much lower than the ecological footprint suggests it would have to be. Examples relating to student's everyday life unmistakably call for personal contributions to sustainability. For example, it is stated that one Google search consumes as much electricity as operating a low-energy lamp for one hour. In the same textbook, the student is told to search for information on the Internet. What is the student supposed to do? (Seydlitz Geographie 10. 2008. GY Bayern, pp. 166-167).

4.7 Developing Visions of the Future: Living in the City of Tomorrow

A look into the future is intended to already instill a spirit of optimism in the young generation of students. With the support of an illustration taken from a fifth grade Geography textbook students as early as the age of 11 are prompted to think about how we might move around in the city of tomorrow. This illustration presents some ideas. Environment-friendly means of transportation dominate traffic: bicycles can be rented, electric rental cars are used for carpooling, or one can take a streetcar or ride a scooter to one's destination. The sun provides energy for space heating and generating electricity in the "green city". The future therefore does not mean doing without, but rather promises a high quality of life for all generations (TERRA Geographie 5. 2003. GY Bayern, pp. 150-151, Fig. 1).

5. EDUCATION FOR SUSTAINABLE DEVELOPMENT—AN ONGOING TASK

If one summarizes the results of the textbook analysis on Education for Sustainable Development, it becomes evident that ESD is often equated with environmental education. In the concept of sustainability, the three pillars – economy, ecology, and society – are equal in value. The textbooks, however, focus on ecology. In this context, doing without is often called

for, e.g., private transport. This must be seen critically, when doing without would impair the economic development of people and nations. This is the case in the example of the tropical rainforest, where people are implicitly accused of being incapable of engaging in efficient utilization of forest resources. One positive aspect that must be pointed out is that textbooks underscore human ingenuity. This involves intelligent utilization of available resources on the one hand and development of new technologies on the other.

Textbooks also call for a change in behavior, usually without directly stating that one should do without something such as one's own automobile, for example. But a simple call to "do without" will probably have little tangible impact. One must redefine the value associated with doing without to such an extent that the concept no longer involves an inherent loss in quality of life. Voluntarily doing without something is readily acceptable for us when new ideas and technologies such as regenerative energy or the Internet permit further development of our sphere of experience without increasing the consumption of resources in the process. Here we must cease assessing the concept "quality of life" in strictly quantitative and primarily material terms. One future-oriented approach to this could involve abandoning the practice of ascribing so much importance to the economic value of material goods in favor of carefully reassessing the importance of quality of life. This approach is already cautiously suggested in some textbooks, it must, however, be expanded.

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This list includes all textbooks investigated; an asterisk (*) denotes those textbooks cited in this article. Abbreviations: GS *Grundschule* (primary school); GY = *Gymnasium* (academic high school in Germany).

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