

Inappropriate terms for educational use in geography

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Some inappropriate terms are employed in high school geography textbooks.

1) In the section on global landscapes, the terms of “orogenic belts” and “orogenic movements” are used to explain landform features of mountains and upheaval of the mountains, while the terms explain just global geologic structures and tectonic geology. Term “orogenic” should be deleted, and “*hendo tai* (mobile belts)” of plate tectonics should be used.

2) “*Sabaku*” in Japanese is the same meaning as desert, but the Chinese characters (kanji) of *sabaku* imply vast sand landscapes so that students imagine that the all deserts are sand deserts. Another characters implying sand free should be suggested.

3) Different usage of Kanji (Chinese characters) between textbooks and popular books appears on some terms such as “erosion” and “glacial period/age” .

Faculty of universities and colleges should revise the textbooks and geographers should propose the correct usage of kanji to journalism.

Keywords: physical geography , orogenic belts, desert, erosion, glacial period

Examination of the biological education term Action of the Society of Biological Sciences Education of Japan

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The keyword of the revision of the current course of study "was modernization of the creature education". In addition, a limit disappeared about the contents, and a term was reformed completely through them, and the number of the terms became enormous, too.

Furthermore, the term had blurring by a textbook, and the standardization of the creature term became the problem. A term may be made questions for by the university entrance exam, and the confusion of the term may affect it even after advancing to the university. A committee in the Society of Biological Sciences Education of Japan organize and will examine a creature education term for the purpose of the standardization of the creature education term in such situation. I announce the summary about such process and result and problem.

Keywords: Biology education term, Course of study, Textbook, Modernization, Explosion of the number of the terms, Standardization

Irrelevant Chemical Terms

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The scientific terms used in Japanese junior-high and high-school science/chemistry textbooks are sometimes irrelevant; namely, either they do not convey the intended meaning, or the same notion is to be expressed by other term(s) in college/university chemical education or research. In 2014 a Subcommittee on High-School Chemical Terms, headed by the presenter, had been organized in the Chemical Society of Japan (CSJ) to survey such terms, and reports on about 30 terms have been published in the CSJ's official journal in 2015 and 2016. Examples include the Japanese translation of de-sublimation, ionic formula, molten salt electrolysis, mass action law, oxonium ion, amount of substance etc. The current status and the desirable direction for improvement are to be discussed in the presentation.

Keywords: chemical terms, high-school textbook, highschool/university linkage

Geoscience and Environmental Science Education in High School

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In 2005 the Science Council of Japan was reorganized. As a result of this reorganization, communication between previously separate societies was increased and coordination of both research and education in geophysics, geology, mineralogy, geography and related fields was greatly improved.

Geoscience is in part concerned with the scientific understanding natural phenomena such as earthquakes, volcanoes, tsunamis and extreme weather like storm and flood damage which can lead to natural disasters. It is also concerned with the scientific clarification of the transport of matter and energy in the Earth and with the understanding the long and short term interactions between various systems operating in it: this study is vital for a proper understanding of environmental degradation, global warming and similar phenomena that accompany the rapidly increasing global population. Because of this the study of the newly defined fundamental field of geoscience is of vital importance if mankind is to construct a stable and enduring society and so to continue to survive on Earth.

Since its foundation the Japan Geoscience Union (JpGU) has of course worked to expand fundamental research –knowledge for its own sake –in the various fields that it covers. But it has also strongly encouraged practical research focusing on aiding society with the issues discussed in the previous paragraph. As part of that process JpGU has stressed the urgency of using elementary, secondary, higher and lifelong education to improve the average level of scientific literacy, and made a number of practical proposals as to how this might be achieved.

Upon its founding in 2005 the JpGU published “High school scientific literacy: a proposal concerning the establishment and content of compulsory subjects within the high school science curriculum” . In 2007 this proposal was made more concrete and released as “High school scientific literacy: a proposal for the selection of compulsory subjects within the high school science curriculum” . Both of these documents were submitted to the Japanese Central Council for Education.

The idea behind these proposals was to provide the general population with sufficient basic scientific knowledge about both geoscience and environmental science that they may understand the various natural disasters and environmental problems that face society, and thereby be able to live safely and with peace of mind. Further, this knowledge should join physics, chemistry, biology and geoscience as part of a new core curriculum of high school science. Since high school science education changed to a selective system, the vast majority of students who have chosen to continue science education have chosen not to study geoscience, which is the subject that currently deals with these issues, and as this has now been the case for quite some time we are now seeing a reduction in the number of specialist teachers and a lowering of scientific understanding of natural disasters and environmental issues amongst the general public.

Building on the lessons learnt from the 2011 Tohoku Earthquake and Tsunami the Science Council of Japan Geoscience Committee released a proposal entitled “Lessons to be learnt about the role of geoscience in society from the 2011 Tohoku earthquake, tsunami and subsequent release of radioactive material” , and this document again stressed the necessity of raising general scientific literacy and ensuring the necessary supply of teachers to do so.

The Science Council of Japan has held a comprehensive debate about science education, covering a number of fields including geoscience. Based on an analysis of the current situation, in February 2016 they produced a proposal entitled “The future direction of high school science education” , with the

goal of drastically strengthening the general scientific literacy of the Japanese population. This proposal aims to increase scientific literacy by advocating a “scientific foundations” course (provisional name) as part of a strengthened upper secondary education syllabus. After taking this course it is suggested that students will build on it by studying physics, chemistry, biology and geoscience, but the divisions between these four subjects should be reduced and soon removed entirely. In July 2016 the JpGU proposed that all subjects in the high school science curriculum be made obligatory.

How to address the issue of technical terms in school textbooks within the geoscience: Current status and future directions

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The Chemical Society of Japan has been considering some problems associated with technical terms in school textbooks of subjects “Basic Chemistry” and “Advanced Chemistry”, which are used at upper secondary schools, and Chemistry within the subject “RIKA” (similar to natural science) which is used at lower secondary schools in Japan since 2014. Reflecting on these circumstances, NEMOTO et al. (2015) raised similar issues regarding technical terms in school textbooks within the field of Earth Science at the symposium of Disaster Prevention Research Institute (DPRI), Kyoto University related with Earth Science Education on the 29th of August in 2015. Moreover, NEMOTO et al. (2016), and YAMAMOTO and OGATA (2016) reported brief results of the issues entitled “The way to overcome problems associated with technical terms in textbooks within the Earth Science” and “Terminological comparison on “Geography” and “Earth Sciences” of high school textbooks”, respectively, at the Japan Geoscience Union (JpGU) 2016 Meeting on the 22nd of May in 2016.

Subsequently, a subcommittee was set up under the Subcommittee of Nurturing of Human Resources (tentative name), the Committee of Earth and Planetary Sciences at the Science Council of Japan (SCJ) in order to solve the issues last autumn. The first meeting of this subcommittee was held on the 30th of October in last year. We decided to focus on 4 subjects which are “Basic Earth Science”, “Advanced Earth Science”, “Geography A”, and “Geography B” for upper secondary school in the first analysis stage. We analyzed a total of 16 versions of textbooks, comprising all technical terms, which appeared an index on all the textbooks.

NEMOTO et al. (2016) reported that there are several problems associated with technical terms in textbooks related in Earth Science in Japan.

The several problems are as below;

(1) Use of “misused words (tentative)”

e.g.: noble gas in Japanese (noble: rare or precious in Chinese characters)

(2) Use of “several words (tentative)”

Several words are used for one meaning.

e.g.: S-P time, S-P lag time, S-minus-P time, P-S time, lag time, P-S lag time

(3) Use of “two or more meanings words (tentative)”

There is a case in which a technical term has two or more meanings. However, only one meaning is used by the word in the textbook.

e.g.: asperity

(4) Use of “extinct words (tentative)”

Some extinct technical terms are written in extinct figure in some textbooks.

e.g.: Figure of classic classification of igneous rocks

(5) Use of “mispronounce words (tentative)”

e.g.: lithosphere (The word is written in textbook not "****fl(upside down e)(r)" but "****fea" in Japanese Characters, Katakana, which are used for writing foreign words in Japanese.)

Moreover, we find other problems. Newfound issues are as below;

(N1) Use of "lack of unity pronunciation word (tentative)"

e.g.: plum rain season (A pronunciation in Japanese is "tsuyu" or "baiu" ?)

(N2) Use of "lack of unity translation word (tentative)"

e.g.: GPS (There are several translation names in Japanese.)

(N3) Use of "lack of unity connection symbol (tentative)"

e.g.: Itoigawa-Shizuoka Tectonic Line (Several connection symbols are used in Japanese.)

In this presentation, we would like to report current status in order to solve the problem. Furthermore, we hope active discussions on the topics will continue among researchers, educators, related in the field of Geoscience including Geography, and relevant parties such as school textbook publishers.

Keywords: textbook, technical term, subject "Basic Earth Science" , subject "Advanced Earth Science" , subject "Geography A" , subject "Geography B"

Problems with high school education caused by the description within textbooks of "Geography" and "Earth Science"

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Yamamoto and Ogata have shown that terminological problems exist in high school textbooks of geography and earth science, focused on geomorphological and climatological words. In this study, I show some cases about the influence of authorized textbooks on the teaching process, relating to this terminological problem.

Education processes in high school tend to use textbooks as doctrine. In other words, the “proper answer” tends to only be limited to the content of the textbooks. For example, when a figure, a term, a definition of the term, and a context are written in a textbook, other figures, terms, definitions and contexts are regarded as “wrong answers”, even if they are adequate. As for terminological problems, the “right answer” in a subject such as geography becomes the “wrong answer” in another subject such as earth science.

Even the task of writing short sentence answers, a common feature of exams, often does not test one's intellect but rather functions as only a fill-in-the-blank activity to test a student's verbal memory. To make matters worse, there are some inadequate descriptions in textbooks.

Under such circumstances, students cannot be evaluated properly, and professors making entrance exams and the students taking them may be embarrassed. Furthermore, such dogmatism may lead students to only memorize the descriptions, instead of thinking about the matters deeply.

To solve these problems, teachers should have proper knowledge and logic, and should know of a diverse selection of description. However, learning variable information in regards to trans-subject matters, thus investing in several textbooks and other source of information, are much too costly for an educator.

Hence, for the solution, if terms and definitions are variable, we should indicate and list these words for educators and the education industry. Furthermore, we should develop a guideline of words and definitions so that we can rid the education process of such inconsistencies, thus making the geoscience study process more efficient.

Keywords: terminology, Textbook of highschool, education of geography, education of earth science

Geoscientific terminology in school education: For future perspectives on geoscientific education

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Geoscientific education is mainly programmed in upper secondary school subjects "Geography" and "Earth Science" in Japan. School curriculums are partly unsuitable for advanced geoscience, and tend to be based on multi-standard terminology. Future perspectives on geoscientific education requires a discussion on relationship between geoscience and school education in Japan.

Keywords: Geoscience, School education, Terminology