

A Term Characterizing Japanese Course of Study for Science: “Yosu,” A Japanese Equivalent of “Appearance”

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ABSTRACT: This paper focuses on a Japanese term “yo-su,” of which possible English equivalents are: appearance, situation, state of affairs, reason and sign. Because this term is frequently used as “appearance” in the document of Japanese Course of Study for Science, the term profoundly affects Japanese pupils’ outlook on investigation or observation in science lessons. Owing to the term “yo-su” in science teachers’ directions, it is highly probable that pupils concentrate attention only on “appearance” of objects although scientists normally seek common patterns, structures, systems, or models behind “appearance” of objects. Therefore, the term “yosu” results in trouble in Japanese pupils’ seeking scientific reality. This is an archetypal example that science teaching is inevitably influenced by its language-culture setting. And how to counteract the language-culture influence is also discussed.

INTRODUCTION

Science educators will naturally focus on their language-culture setting for science education if they approach science education from a viewpoint that it is a social phenomenon. However, if science educators hold another viewpoint that it should be the teaching of science anyhow, it becomes difficult for them to break the spell of the universality of science. The modifier “language-culture” will be abbreviated to “L-C” in the following. Establishing the L-C-conscious viewpoint on science education, science educators can correct an impression that science education is or should be conducted in the same way regardless of any culture, a value system. From the L-C-conscious viewpoint one of the present authors (Kawasaki 2002) has illuminated the point that the Japanese L-C setting for science education has a decisive influence over science education, juxtaposing the English and the Japanese L-C settings. The Japanese L-C setting exhibits a striking contrast to the English L-C setting: the Japanese language has never established methods for composing abstract nouns and turning adjectives into corresponding abstract nouns. Consequently, pupils rarely employ abstract nouns in their carrying out scientific thought.

Because abstract nouns are essential for the scientific thought, what pupils do in the science classroom in the Japanese L-C setting must be far from being scientific. On the basis of their observation on science classes of the fourth grade of primary school, Nakayama, the first author of the present paper, and Iwakiri (1999) suggested: Pupils try to give a full description of diversity of a scientific phenomenon they are really faced with, not to confirm their conclusion asserting ideals or universals according to the scientific way of thinking. This is an example of the influence caused by the Japanese L-C setting, because the scientific thought, by its nature, should value ideals or universals abstracted from diversity of appearances of a scientific phenomenon. According to the observation made by Nakayama and Iwakiri, pupils have an opposite perspective on “experiment” in the science classroom. It is abstract nouns that express ideals or universals, but Japanese pupils cannot find the way to deal with abstract nouns successfully in their L-C tradition. This problem about science education must be shared with other L-C settings where languages do not involve the established

methods for making abstract nouns.

The issue that needs to be discussed in such L-C settings is a strategy for handling abstract nouns in the science classroom. Science educators can teach pupils how to carry out the scientific thought in these L-C settings only after science educators resolve the following L-C origin difficulties. First, science educators have to remind themselves of the linguistic feature involving no abstract nouns. Second, science educators have to have the correct understanding of the role of abstract nouns in the scientific thought.

In order to resolve these difficulties, the present paper focuses on the Japanese term “yo-su,” of which possible English equivalents are “appearance,” “situation,” “circumstance,” “state of affairs,” “reason” or “sign.” In the science classroom in Japan teachers normally use this Japanese term in order to draw pupils’ attention to their experimental results. However, teachers seldom say the Japanese terms “chu-sho” and “hon-shitsu” translated respectively from “abstract” and “reality” because of an L-C barrier to using them. The Japanese term “yo-su” has appeared in Japanese writing for more than six hundred years whereas these Japanese terms “chu-sho” and “hon-shitu” were coined at the time when Japan opened to the world in the mid-nineteenth century.

Because this Japanese term “yo-su” frequently appears the document of Japanese Course of Study for Science, contextual investigation into how this Japanese term is used will illuminate the Japanese L-C setting for science education. Therefore, the present investigation will offer suggestions for improvements in pupils’ carrying out the scientific thought. These suggestions must be applicable to similar L-C settings to the Japanese setting for science education.

Method

We checked current Japanese Course of Study for Science and picked up sentences including term “yo-su”. Next we tried to translate these sentences to English to know the meaning of “yo-su” in each sentence.

Result

Table 1 and table 2 show the sentences including “yo-su” in Japanese Course of Study for Science.

Tab .1 “Yo-su” in Japanese Course of Study for Primary School Science (in Japanese)

	former words	yo-s	following words
P1	日なたと日陰の地面を比較しながら調べ、見いだした問 もって追究する活動を通して、太	様子	との関係についての見方や考え方を養う。
P2-1	日陰の位置の変化や、日なたと日陰の位置の変化や、日なたと日陰の地面の様子を調べ	様子	を調べ、太陽と地面の様子との関係についての考えをもつ
P2-2	日陰の位置の変化や、日なたと日陰の地面の様子を調べ	様子	場との関係についての考えをもつようにする。
P3	月や星の位置の変化、空気中の水	様子	を時間や水の性質と関係付けながら調べ、見いだした問 もって追究する活動を通して、月や星の動き、水の変化 考え方を養う。
P4	金属、水及び空気を温めたり冷やしたりして、	様子	初変化の金属、水及び空気の性質についての考えをもつ
P5	水が水蒸気や氷に	様子	を観察し、温度と水の変化との関係などを調べ、水の状 考えをもつようにする。
P6	天気の変化や流	様子	を時間や水量、自然災害などに目を向けながら調べ、見 画的に追究する活動を通して、気象現象や流水の動きの 見方や考え方を養う。
P7	植物を育て、植物の発芽、成長及	様子	を調べ、植物の発芽、成長及び結実とその条件について にする。
P8	魚を育てたり人の発生についての資料を活用したりし	様子	を調べ動物の発生や成長についての考えをもつように
P9	魚には雌雄があり、生まれた卵は日がたつ	様子	が変化してかえること。
P10	おもりを使い、おもりの重さや動く速さなどを	様子	を調べ動く物の動きの規則性についての考えをもつように
P11	1日の天気	様子	を観測したり、映像などの情報を活用したりして、天気 べ、天気の変化の仕方についての考えをもつようにする
P12	地面を流れる水や	様子	を観察し、流れる水の速さや量による動きの違いを調べ と土地の変化の関係についての考えをもつようにする。
P13	雨の降り方によって、流れる水の速さや水の量が変わ	様子	が大きく変化する場合があること。
P14	土地のつくりと変	様子	を自然災害などと関係付けながら調べ、見いだした問題 る活動を通して、土地のつくりと変化のきまりについて 養う。
P15	いろいろな水溶液を使い、その性質や金属	様子	を調べ、水溶液の性質や動きについての考えをもつよう

Tab. 2 "Yo- su" in Japanese Course of Study for Lower Secondary School Science (in Japanese)

	former words	yo- su	following words
S1	物体に力を働かせる実験を行い、物体に力が働くとそ	様子	が変わったりすることを見いだすとともに、物体に働く
S2	り動き始めたり、速	様子	験を行い、力がつり合うときの条件を見いだすこと。
S3	物質が水に溶	様子	の観察や再結晶の実験を行い、水溶液の中では溶質が均
S4	大地の活動	様子	こと及び水溶液から溶質を取り出す方法を見いだすこと
S5	地層と過去	様子	や身近な地形、地層、岩石などの観察を通して、地表に
S6	火山の形、活	様子	物・現象を大地の変化と関連付けてみる見方や考え方を
S7	地震の体験や記録を基に、その揺れの大きさや伝わり	様子	及びその噴出物を調べ、それらを地下のマグマの性質と
S8	くとともに、地震の原因を地球内部の働きと関連付けて	様子	るとともに、火山岩と深成岩の観察を行い、それらの組
S9	う土地の変	様子	関連付けてとらえること。
S10	動物が外界の刺激に適切に反応	様子	を理解すること。
S11	「野外観察」については、学校の周	様子	の観察を行い、その仕組みを感覚器官、神経系及び運動
S12	アの(ア)については、動物を観察し、食物のとり方、運	様子	連付けてとらえること。
S13	達、体の表面	様子	や呼吸の仕方の違いに気付かせること。
S14	イの(ア)の「太陽の特徴」については、形、大	様子	な差を取り上げ、放出された多量の光による地表への影
S15		様子	と。

“yo-su” appears 16 times in 15 sentences in the document for primary school, and 10 times in the document for lower secondary school.

Table 3 and Table 4 shows translated sentences from table 1 and table 4.

Tab3. "Yo-su" in Japanese Course of Study for Primary School Science (in English)

- P1 Through activity of comparing sunny and shade surface of ground, and of investigating the problem found by him/herself with interest, develop pupils' ideas of relation between sun and "yo-su" of surface of ground
- P2 Make pupils investigate change of the location of the shade and the "yo-su" of the sunny and shade surface of ground, and have own ideas of relation between sun and the "yo-su" of surface of ground.
- P3 Through activity of investigating the change of the location of moon and stars, and "yo-su" of the change of water in air in relation with time or characteristics of water, and of investigating the problem found by him/herself with interest, develop pupils' ideas of motion of moon and stars and the change of water.
- P4 Make pupils investigate the "yo-su" of change by warming and cooling metals, water, or air, and make pupils have own ideas of characteristics of metals, water, and air.
- P5 Make pupils observe "yo-su" of water becoming to vapour or ice and investigate relation between temperature and change of water, make pupils have own ideas of condition change of water.
- P6 Through activity of investigating the change of weather and "yo-su" of flowing water by focusing on time, amount of water, and natural disasters, and investigating found problems according to plans, and make pupils have own ideas of regularity of weather phenomena and function of flowing water.
- P7 Make pupils grow plants, investigate the germination of plants and "yo-su" of growth and fruition, and make pupils have ideas of growth and fruition and the conditions of these.
- P8 Make pupils rear fish and use material, and investigate "yo-su" of the change of eggs, and make pupil have ideas of development and growth of animals.
- P9 There are male and female fish and laid eggs change "yo-su" of inside day to day and hatch.
- P10 Make pupils use weight and investigate "yo-su" of motion of objects by changing weight or speed of weight, and make pupil have ideas of regularity of motion of objects.
- P11 Make pupils observe "yo-su" of weather of one day, and use information as movies, and how weather change, and make pupils have ideas of how weather change.
- P12 Make pupils observe "yo-su" of water flowing on ground and river, and investigate difference of function of water according to speed and amount, and make pupils have ideas of relation between function of flowing water and the change of ground.
- P13 According to how rain falls, speed and amount of water change, and by rising of a river "yo-su" of ground sometimes change.
- P14 Through activity of investigating structure of ground and "yo-su" of change in relation with natural disasters, and of investigating found problems in variety of view points, develop pupils ideas of structure and rules of change.
- P15 Make pupils use variety of solutions and investigate "yo-su" of changing the characteristics of solutions and metals, and make pupils have ideas of characteristics and function of solutions.

Tab4. "Yo-su" in Japanese Course of Study for Lower Secondary School Science (in English)

S1	By doing experiment of acting force to a object and find out a object start to move or " yo-su " of motion change when a force act to a object, and by doing experiment of two forces acting a object and find out conditions of equilibrium of force.
S2	By observing " yo-su " of materials dissolves in water or doing experiment of re-crystalization, and finding that solute is diffused uniformly in solution and the method to take out solute from solution.
S3	Through observation of activity of firm ground and " yo-su " of familiar topography, stratum, and rocks, and develop pupils' ideas of variety of events and phenomena in surface of ground in relation with change of firm ground.
S4	Stratum and " yo-su " of past.
S5	By investigating shape of a volcano, " yo-su " of activity of it, and eruptions from it grasp those in relation with characteristics of magma under ground , and by observing volcanic rock and plutonic rock grasp the difference of texture in relation with origin.
S6	Be aware of regularity of amplitude and transmission based on ones experience, and grasp the cause of earthquake in relation with function of inner part of the earth, and understand " yo-su " of change of ground with a earthquake.
S7	By observing " yo-su " of animals responding to stimulus from outside, grasp the mechanism in relation with structure of sense organs, nervous system, and motion organs.
S8	Observation in outdoor field should be done as activity of observing " yo-su " of stratum near school.
S9	By observing animals make pupil be aware how to take foods, development of motion organs and sense organs, " yo-su " of surface of body, and difference of how to breath.
S10	In "Characteristics of the sun" shape, size, " yo-su " of surface should be took up, and influence on surface of ground from amount of emitted light.

Almost of "yo-su" in these sentences are hard to translate to English. Because there are no term fit to "yo-su" in English. In some sentences "yo-su" is NOT necessary term for scientific description. In such case we can translate the sentence in disregard for "yo-su" unless affecting whole meaning.

In other cases "yo-su" means "appearance" "situation", "circumstance", "state of affairs", or "sign." For Example first sentence of tab. 1 can be translated as follows (P1 in Tab. 3).

Through activity of comparing sunny and shade surface of ground, and of investigating the problem found by him/herself with interest, develop pupils' ideas of relation between sun and APPEARANCE of surface of ground

In this sentence the term "appearance" implies "dry or wet", "hot or cool", "bright or dark", "many plants or less plants grows" and so on. There is variety of phenomena appearing in the surface of ground. "yo-su" has such vague but variety of meaning about the appearance.

Tab. 5 and Tab. 6 shows implied meaning of "yo-su" in sentences of Japanese Course of Study for Science.

Tab. 5 Implied meaning of Nyo-suÓ in primary school document

P1	dry or wet, hot or cool, bright or dark, many plants or less plants grows and so on
P2	dry or wet, hot or cool, bright or dark, many plants or less plants grows and so on
P3	water become to vapour or ice
P4	expansion or shrinking of materials
P5	water become to vapour or ice
P6	big rocks, sand, mud, erosion, carrying, and piling up by water, or change of amount or speed of river water, and so on
P7	any what observable appearance of plants
P8	any what observable change in egg of small fish for example growth of fish in egg
P9	any what observable change in egg of small fish for example growth of fish in egg
P10	speed, period, distance, and so on
P11	sunshine, cloudy, rainy, big rocks, sand, mud, erosion, carrying, and piling up by water, or change of amount or speed of river water, and so on
P12	damaged ground by flood or big rain and so on
P13	damaged ground by flood or big rain and so on
P14	damaged ground by flood or big rain and so on
P15	dissolving to water, generating bubbles and so on

Tab. 6 Implied meaning of *yo-su* in lower secondary school document

S1	bended, dented, or deformed object
S2	disappear in water, material that has not dissolved in water, and so on
S3	shape of volcano, eruption from volcano, magma, earthquake, and so on
S4	circumstances around stratum many years ago
S5	shape of volcano, eruption from volcano, magma, and so on
S6	cracks and cave etc. by earthquake
S7	reflex movement and so on
S8	outlook or appearance of stratum, small rock, sand, mud included in stratum
S9	skin, feather, fur of animals
S10	dark spot, prominence, and any what on the surface of sun

In Tab. 3 “yo-su” of P3, P4, P6, P7, P8, P9, P10, P11, P12, P13, P14 are unnecessary. But they have implied meaning showed in tab. 5. “yo-su” of P1, P2, P5, P15 should be somewhat appeared or observable. In all sentences of Tab.3 “yo-su” means somewhat appeared or observable.

In Tab. 4 “yo-su” of S1, S6, S8, S10 are unnecessary. But they have implied meaning showed in tab. 6. “yo-su” of S2, S3, S4, S5, S7, S10 should be somewhat appeared or observable.

Like these some sentences in Japanese course of study for science use the unique Japanese concept “yo-su”. The meaning of it is difficult to translate to English. But “yo-su” has implied meaning of “somewhat appeared or observable”, namely “appearance”.

IMPLICATION

In the document of Japanese Course of Study for Science the term “yo-su” is used referring to observation. The implied meaning of “yo-su” is somewhat appeared or observable; namely “yo-su” means “appearance”. “yo-su” draw our attention to some kind of facts, but never to what exists behind the facts. “yo-su” has a function to associate a fact with other facts. The important feature of “yo-su” is not to refer to reality behind the facts.

We found out a tendency not to focus on the reality in observation by using a word “yo-su” in Japanese Course of Study for Science It is one of influence to science education from L-C tradition in Japan.

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