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Intra-observer evaluation of teacher-student questioning behaviours: A case study of the quality and frequency of questions administered in physical education theory class

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Abstract
Questioning in teaching and learning environment is an effective way of encouraging learners to contribute to the subject matter. A lesson is incomplete without questioning learners or offering learners the opportunity to question the teacher. Teachers should engage learners in high-order questions that trigger critical thinking in teaching and learning environment. However, studies that focused on judging the quality of questions generated in classroom setting revealed that most classroom questions fell within lower-order of thinking (Caspari-Sadeghi *et al*., 2021; Momsen *et al*., 2010). Again, earlier study conducted by a group of psychologists revealed that over ninety-five percent (95%) of the questions learners encountered required them to think at the lowest possible level - the recall of information (Bloom *et al*., 1956). Based on Bloom's original work relating to cognitive levels of thinking, we conducted a descriptive analysis of the quality and frequency of questions administered in a lesson involving 38 students of a College of Education and one physical education teacher (intern of a University in Ghana). Specifically, we concentrated on classroom behaviours that related to the quality and frequency of questions asked in physical education (PE) classroom setting. From a video-recorded lesson, data on questioning behaviours of students and the teacher in a theory physical education class were collected via self-developed event recording instrument. An expert in research (senior university faculty) inspected and approved the instrument for collecting accurate data for the study. Data were descriptively analyzed and presented in tables and figures. Analysis of intra-observer results revealed that most of the classroom questions were lower-order questions that did not promote critical thinking among students. In order of magnitude (lowest level to highest level), questions asked by the teacher occurred at the level of knowledge, understanding, synthesis and evaluation. Findings also revealed that there was no question asked at the level of application and analysis by the teacher in the entire 35 minutes lesson. The study showed that students did not ask any question(s) in the entire duration of the lesson. We recommend that questions of various levels should form part of planning decisions of every teacher.

Keywords: Instruction, lower-order questions, higher-order questions, event recording

Introduction
Questioning in teaching and learning environment is one of the interactions that happen regularly between the teacher and the learner. However, classroom research into the quality of questions and how frequently these questions occur in teaching and learning environment has not gained much attention in most educational institutions. A study relating to questioning culture of teachers and students revealed that most questions generated during teaching and learning environment were lower-order questions (Belmekki, 2021; Zheng *et al*., 2008) [6, 17]. This situation does not lead to critical thinking among students. Effective questioning in classroom environment can arouse interest and enhance the learning process of the students.
On regular basis, questions should be used to assess achievement levels of instructional goals and objectives of the lesson. When adopted properly, classroom questions can be a powerful instructional strategy for promoting positive interaction between the teacher and the learner.

Students should be given the opportunity to ask questions and consider the opportunity given them as a valuable activity during lesson time. In this case, teaching and learning should be made a shared responsibility between the teacher and the learner. In most cases, students become passive respondents when the teacher dominates questioning culture during lesson delivery. Notably, a good questioning culture is a type that both the teacher and the students have equal opportunity to ask questions during teaching and learning situation.

According to Bloom *et al*. (1956) [7], over 95% of the questions students encountered required them to think at the lowest possible level - the recall of information. Based on Bloom taxonomy of educational objectives, six levels of questions within the cognitive domain, from simple recall or recognition of facts at the lowest level, through increasingly more complex and abstract mental levels to the highest level could be identified. The cognitive domain from which levels of questions generated in teaching and learning environment are derived deals with mental processes including information processing. It is by these processes that individuals acquire knowledge and solve problems. The various levels of questions students encounter in classroom setting can be classified into lower or higher level of thinking based on Bloom taxonomy (Bloom *et al*., 1956) [7]. Currently, there are two versions of Bloom taxonomy – the old (original) version and the revised version (Anderson & Krathwohl, 2001). Figure 1 presents the two versions of Bloom taxonomy.

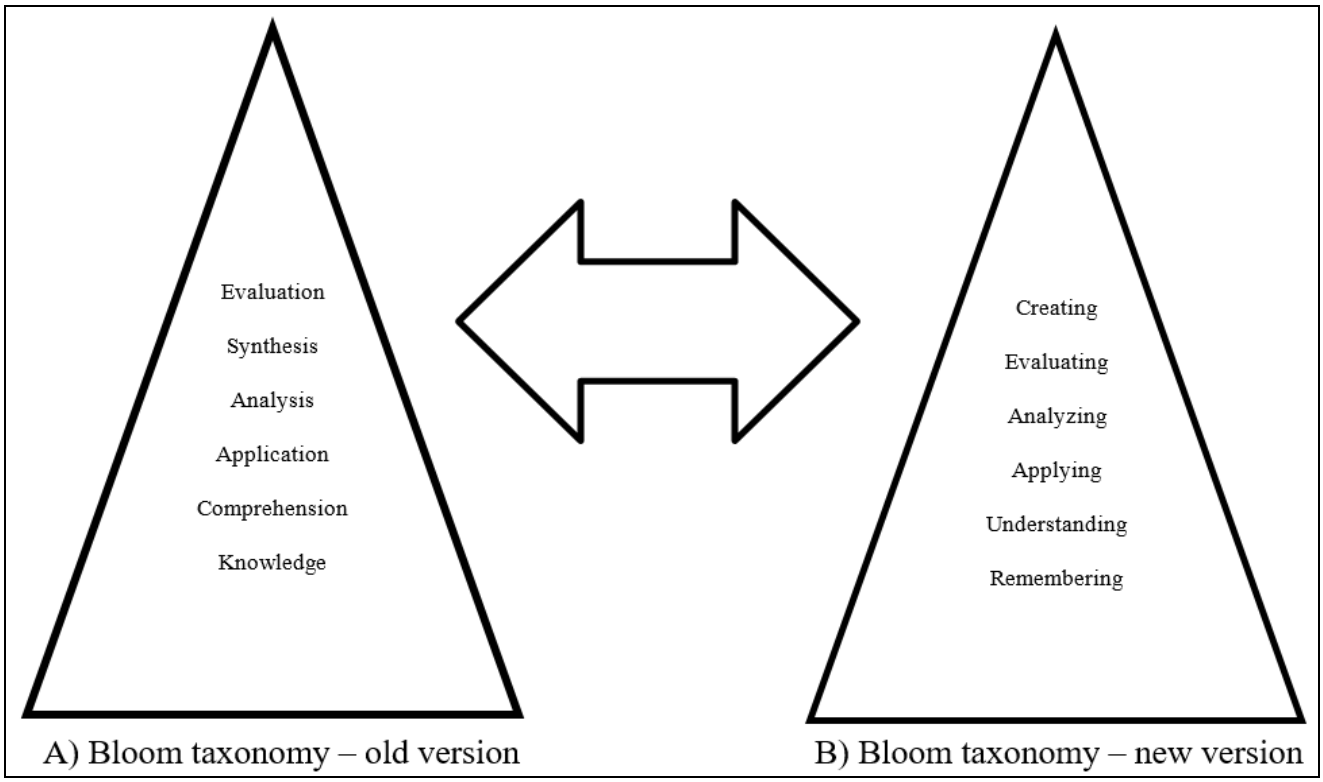

Fig 1: Old and new versions of Bloom taxonomy

Based on the original work of Bloom *et al*. (1956) [7], six educational objectives were identified and classified as knowledge, comprehension, application, analysis, synthesis, and evaluation (Figure 1A&B). Below are examples of verbs that represent intellectual or thinking activity at each level:

- **Knowledge:** Arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, state and reproduce.
- **Comprehension:** Classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, and translate.
- **Application:** Apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use and write.
- **Analysis:** Analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, and test.
- **Synthesis**: Arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, and write.
- **Evaluation:** Appraise, argue, assess, attach, choose, compare, defend, estimate, judge, predict, rate, core, select, support, value and evaluate.

The assertion by Bloom *et al*. (1956) [7] that over 95% of questions students encountered required them to think at the lowest possible level - the recall of information provided the foundation for this study. Therefore, the cognitive levels of thinking in the original work of Bloom were used as the basis for investigating the quality of teacher-student questions generated in physical education class setting.

Research Questions

The following questions were addressed:

1. What is the quality of questions asked by the teacher in physical education theory class?
2. What is the quality of questions asked by the students in physical education theory class?
3. What is the frequency of questions asked by the teacher in physical education theory lesson?
4. What is the frequency of questions asked by the students in physical education theory lesson?

Methods

Study Design

The investigation was a case study of teacher-student questioning behaviours in PE theoretical classroom setting.

The lesson was video-recorded in actual teaching and learning environment where students and a teacher engaged in classroom instruction.

Population

Participants were 38 students of a college of education and one physical education teacher (an intern of a University in Ghana). One video-recorded lesson was randomly selected for the study. By this process, all the students who took part in the video-recorded lesson were automatically "self-selected" as participants for the study. In all, the sample was composed of 39 subjects.

Data Collection and Analyses

The main instrument used for data collection was self-developed event recording instrument which was named as Teacher & Students Questioning Behavior Instrument (TSQBI). An expert in research (senior university faculty) validated it. By this approach, the instrument was submitted to a professor in physical education who inspected and ascertained the capability of the instrument for collecting accurate data. According to literature, event recording instrument of this kind should be systematic, easy to use and capable of recording accurate data on teacher behaviours that could be defined and measured (Siedentop & Tannehill, 2000) [15]. The TSQBI was convenient and enabled a frequency tally of questioning behaviours from the video-recorded lesson. Rubrics of the TSQBI were based on taxonomy of educational objectives (Bloom *et al*, 1956) [7].

An experienced physical educator engaged in two separate observations to collect and categorize questions from the video-recorded lesson. Precisely, the same video-recorded lesson was observed on two separate occasions with two weeks interval. This was to avoid interference with previously observed teacher-student questioning behaviours. The use of event recording format of this kind has been found reliable in documenting and reporting investigation of a similar nature (Siedentop & Tannehill, 2000) [15].

To ensure reliability of data, intra-observer agreement checks were conducted. In this case, data were reliable if intra-observer agreement (IOA) of at least 80% was achieved in each observed questioning behaviour of the teacher or the students. Statistical analysis revealed high reliability of data in all observed questioning behaviours (table 3).

Results

Quality & Frequency of Teacher-Student Questions (Observation One)

Analysis of data based on observation 1 indicated that the teacher asked a total of 35 questions during the PE lesson that lasted 35 minutes. Out of the 35 questions, 12 related to knowledge level, 13 were found at the level of comprehension, one at the level of synthesis and nine at the level of evaluation. The teacher did not ask questions relating to application and synthesis levels. Notably, the students did not ask any question(s) in the entire 35 minutes lesson. Table 1 presents the results.

Table 1: Quality & Frequency of Teacher-Student Questions (Observation one - 35 minutes lesson)

Question Level (Quality)	Frequency of Questions			Total
	Teacher	Male Students	Female Students	
Knowledge (Recall)	12	0	0	12
Comprehension	13	0	0	13
Application	0	0	0	0
Analysis	0	0	0	0
Synthesis	1	0	0	1
Evaluation	9	0	0	9
Total	35	0	0	35

Quality & Frequency of Teacher-Student Questions (Observation Two)

From the same video-recorded lesson, data analysis based on observation 2 revealed that the teacher asked a total of 37 questions; 15 at the level of knowledge, 12 at the level of comprehension, 1 at the level of synthesis and 9 at the level of evaluation. No question related to application and synthesis. Students did not ask any question(s) in the entire 35 minutes lesson.

Table 2: Quality & Frequency of Teacher-Student Questions (Observation two - 35 Minutes lesson)

Question Level (Quality)	Frequency of Questions			Total
	Teacher	Male Students	Female Students	
Knowledge (Recall)	15	0	0	15
Comprehension	12	0	0	12
Application	0	0	0	0
Analysis	0	0	0	0
Synthesis	1	0	0	1
Evaluation	9	0	0	9
Total	37	0	0	37

Quality & Frequency of Teacher-Student Questions (Intra-Observer Results)

Intra-observer results show that an average number of questions asked by the teacher were: 13.50 for knowledge (37.50%), 12.50 for comprehension (34.72%), 0 each for application and analysis, one for synthesis (2.78%) and 9 for evaluation (25.00%). Data on knowledge questions yielded intra-observer reliability of 80%, comprehension (92.31%), synthesis (100%), and evaluation (100%). Table 3 presents the results.

Table 3: Intra-observer Results on the Quality of Questions asked by the Teacher (Total number of questions in 35 minutes lesson = 36)

Question Level (Quality)	Frequency	Percentage (%)	Data Reliability			
			Observation 1	Observation 2	Equation	Percentage (%)
Knowledge	13.50	37.50	12	15	$\frac{12\times100}{12+3}$	80
Comprehension	12.50	34.72	13	12	$\frac{12\times100}{12+1}$	92.31
Application	0	0	0	0	_	_
Analysis	0	0	0	0	_	_
Synthesis	1	2.78	1	1	$\frac{1\times100}{1+0}$	100
Evaluation	9	25.00	9	9	$\frac{9\times100}{9+0}$	100

The Order by which Questions were Frequently Used by the Teacher

Questions produced by the teacher were more frequently targeted at the lowest level of thinking (knowledge) than other levels. There was no question devoted to application and analysis. Figure 7 presents order of magnitude by which questions frequently occurred during the lesson.

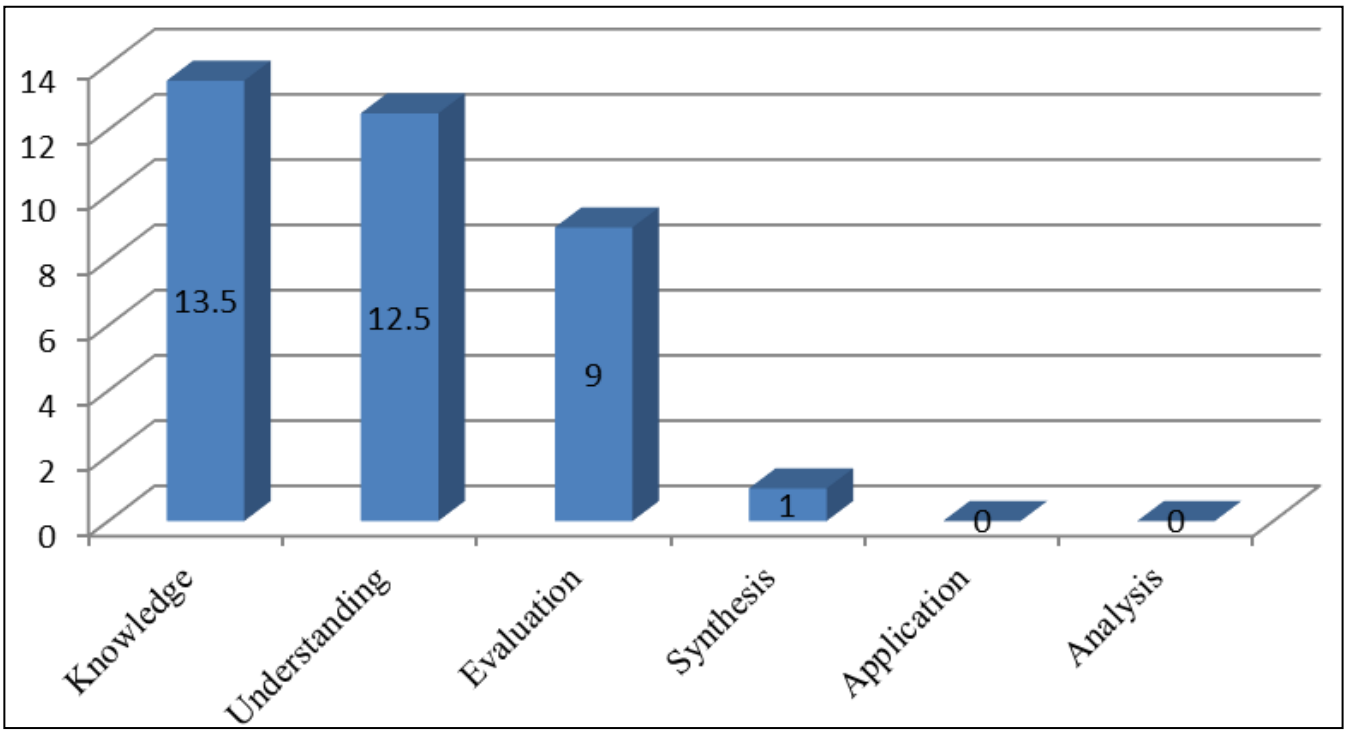

Fig 2: Frequency order by which questions were used by the teacher

Discussion

Findings from the current study revealed that questions were mostly concentrated at the lowest level of thinking (knowledge - recall of specific information). Again, intra-observer analysis of data showed that 26 questions (72%) were lower-order questions. This situation does not promote critical thinking among students. A similar study on questioning culture of teachers and students revealed that "majority of questions generated by students (66%) were classified at the lower category (remembering), 25% at level 2 (understanding), and less than 10% at level 3 (application) of Bloom taxonomy" (Caspari-Sadeghi *et al*., 2021, p.3) [8]. Earlier findings by Bloom *et al*. (1956) [7] showed that teachers asked over 95% of questions at the lowest possible level.

Evidently, this study suggests that the teacher concentrated heavily on the use of lower level questions during the lesson. This situation is not different from related studies that focused on judging the quality of questions asked in teaching and learning environment. For instance, Zheng *et al*. (2008) [17] reported that a high proportion of questions fell in the lowest two levels – remembering and understanding. Similarly, Momsen *et al*. (2010) [12] reported that about 90% of questions teachers asked targeted the lowest two levels of Bloom taxonomy. According to research, appropriate questioning techniques are essential in the teaching and learning environment (Shanmugavele, 2020) [14], play a significant role in motivating learners (Albergaria-Almeida, 2010) [1] and that teachers should use questioning strategies that are effective and meaningful in classroom situation (Amalia & Devanti, 2016) [3].

Questions should be seen as powerful tools that can be used to spark students' interest, curiosity and critical thinking (Alorvor, 2014) [2]. However, literature indicates that "Teachers ask typically low level questions, requiring mainly memory" (Albergaria-Almeida, 2010, p.306) [1]. Concentrating largely on lower level questions does not elicit thought-provoking ideas from learners in teaching and learning environment. At the planning stage, teachers should prepare adequately for the kind of questions they would ask

learners during the teaching and learning process. In such instance, a list of questions could be prepared in advance and administered as the teaching progresses. Alternatively, Guthrie *et al*. (2007) [10] advocates that question rubric could be developed to address poor nature of questions asked during instruction.

Findings also revealed that questions at comprehension level were the second regularly asked questions by the teacher. Notably, comprehension questions are within lower-order questions that do not trigger high-level thinking among students. Questions asked in classroom situation should be thought-provoking and enable students to engage in active participation in the lesson (Long *et al*., 2015) [11], stimulate critical thinking (Shamugavele, 2020) [14], increase students interests and motivation (Chin & Osborn, 2008) [9], generate interaction among students (Tofade *et al*., 2013) [16] and form central part in teaching practice (Belmekki, 2021) [6]. In this study, questions relating to application level were absent in the entire 35 minutes lesson. This could be attributed to poor planning for the kind of questions to ask learners in teaching and learning environment. Against this situation, Phan and Nguyen (2021) [13] advocates that questioning should be seen as a potential tool to provoke student thinking.

Findings from intra-observer results indicated that 10 questions (22%) were found at the higher-level of thinking. Specifically, the study found that questions at analysis level were absent in the entire duration of the lesson observed. Students did not ask any question(s) relating to analysis. Although synthesis is the second highest level of question, this research indicated that only one (1) question representing 2.86% was asked at the level of synthesis. Again, the students did not ask any question(s) relating to synthesis. Like earlier situation, this could be attributed to improper planning for distribution of questions across question levels. Evaluation questions occupy the highest level of educational objectives identified in the original work of Bloom *et al*. (1956) [7]. The ability of the teacher to ask quality questions such as evaluation questions allows learners to think in diverse ways. The skill of asking learners to express their opinion based on high-level questions could potentially promote diverse views, expressions and critical thought of learners in the teaching and learning environment. In this study, 9 out of 36 questions were devoted to evaluation questions by the teacher. This represents 25% of the total number of questions produced by the teacher during the lesson. The low percentage of high-order questions implied that a more conscious effort should be made in order to succeed in promoting critical thinking through the use of thought provoking questions. Conspicuously, students did not ask question(s) at the level of evaluation. It is essential to note that when teachers dominate question culture during lessons, students are reduced to passive respondents. This situation does not promote positive student-teacher interaction. Higher-order questions should be encouraged since it is a sure way to promote critical thinking among students.

To avoid failure relating to quality and distribution of questions in classroom situation, teachers can develop a format of phrasal verbs that could potentially give a clue to the level of questions expected during the lesson. For instance, a student may use questions beginning with phrasal verbs such as: analyze, calculate, compare and contrast. This form of phrasal verbs can potentially guide against total failure and absence of desired question quality during lesson delivery.

Recommendations

Based on the study, we recommend that:

1. Questions of various levels should form part of planning decisions of every teacher to engage students meaningfully in classroom interaction.
2. .Teachers should adopt a good questioning culture in a manner that enhances student-teacher interaction in the teaching and learning environment.
3. Teachers should spread questions over lower and higher cognitive levels using revised Bloom taxonomy as a guide.
4. Questioning behaviors in classroom situation should be a shared responsibility between the teacher and the students.

References

1. Albergaria-Almeida P. Classroom questioning: teachers' perceptions and practices. Procedia-Social and Behavioral Sciences 2010;2(2):305-309.
2. Alorvor LK. Effective teaching strategies for teachers: National building through effective teaching. Spirit, Soul and Body Limited 2014.
3. Amalia AR, Devant YM. The Use of Questioning Strategy to Improve Students' Reading Comprehension. Journal of English Language, Literature, and Teaching, 2016, 1(2).
4. Anderson LW, Krathwohl DR. A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. New York 2001.
5. Azad SA, Kuchy SA. Teacher Effectiveness of high school teachers in relation to some demographic variables. Research Gate 2021. https://www.researchgate.net/profile/Sheeraz-Ayoub-Kuchy-2/publication/354849324.
6. Belmekki L. Classroom Questioning Culture: Benefits, Characteristics, Opportunities and Obstacles. Revue Linguistique et Référentiels Interculturels 2021;2(1):36-40.
7. Bloom BS, Engelhart MD, Furst EJ, Hill WH, Krathwohl DR. Handbook I: cognitive domain. New York: David McKay 1956.
8. Caspari-Sadeghi S, Forster-Heinlein B, Maegdefrau J, Bachl L. Student-generated Questions: Developing Mathematical Competence through Online-Assessment. International Journal for the Scholarship of Teaching & Learning, 2021, 15(1).
9. Chin C, Osborne J. Students' questions: a potential resource for teaching and learning science. Studies in science education 2008;44(1):1-39.
10. Guthrie JT, McRae A, Klauda SL.. Contributions of concept-oriented reading instruction to knowledge about interventions for motivations in reading. Educational Psychologist 2007;42(4):237-250.
11. Long M, Blankenburg R, Butani L. (Questioning as a teaching tool. Pediatrics 2015;135(3):406-408.
12. Momsen JL, Long TM, Wyse SA, Ebert-May D. Just the facts? Introductory undergraduate biology courses focus on low-level cognitive skills. CBE—Life Sciences Education 2010;9(4):435-440.
13. Phan NPT, Nguyen HB. Teachers' perceptions of questioning as pre-teaching stage in general english classes. European Journal of English Language Teaching 2021, 6(5).
14. Shanmugavelu G, Ariffin K, Vadivelu M, Mahayudin Z, Sundaram MAR. Questioning Techniques and Teachers'

Role in the Classroom. Shanlax International Journal of Education 2020;8(4):45-49.
15. Siedentop D, Tannehill D. Traditional Methods For Assessing Teaching. Developing Teaching Skills in Physical Education, 2000, 324-328.
16. Tofade T, Elsner J, Haines ST. Best practice strategies for effective use of questions as a teaching tool. American journal of pharmaceutical education, 2013, 77(7).
17. Zheng AY, Lawhorn JK, Lumley T, Freeman S. Application of Bloom's Taxonomy Debunks the “MCAT Myth". Science-New York 2008;319(5862):414.