

The diagram illustrates the support provided by Japan International Cooperation Agency (JICA) for mathematics projects across various countries. It features a central box labeled "Supporting and Enhancing the Projects by Japan International Cooperation Agency JICAによる算数・数学関連プロジェクトの数学委員会関係者による支援". Arrows point from this central box to several countries, each with a brief description of the project's focus:

- Ghana**: ガーナ
Shantou Univ., 仙台大学
- Bosnia and Herzegovina**: ボスニア・ヘルツェゴビナ
Univ. of Tuzla, 仙台大学
- Egypt**: エジプト
Hokkaido Univ. of Edu., 北海道教育大学
- South Africa**: 南アフリカ
Naruto Univ. of Edu., 鹿児島教育大学
- Myanmar**: ミャンマー
Sri Lanka
Bangladesh
Hiroshima Univ., 広島大学
- Cambodia**: カンボジア
Aichi Univ. of Edu.
愛知教育大学
- Laos**: ラオス
Hokkaido Univ. of Edu., 北海道教育大学
- Philippines**: フィリピン
Cebu Univ., 仙台大学
- Chile**: チリ
Univ. of Toulouse, 仙台大学
- Indonesia**: インドネシア
Ganesha Univ., 仙台大学
- Cameroon**: カメルーン
Hokkaido Univ. of Edu., 北海道教育大学
- Honduras**: ホンジュラス
Univ. of Tauluba, 仙台大学
- Laos**: ラオス
Hokkaido Univ. of Edu., 北海道教育大学
- Myanmar**: ミャンマー
Sri Lanka
Bangladesh
Hiroshima Univ., 広島大学
- Philippines**: フィリピン
Cebu Univ., 仙台大学
- Chile**: チリ
Univ. of Toulouse, 仙台大学

Below the country descriptions, arrows point to three main categories of support:

- Japanese Universities' Contributions via JICA Projects**
- Preparation of New Projects**
- Feedback to Japanese Education**

- 拠点システムの活動
パンフレットを読んでください！
- B. International Symposium for Sharing
経験の共通化と国際シンポジウムの開催


APPS - International
Symposium for Sharing
Experiences, Twinkling Brilliance
Through Lessons Study

(2 times a year)
International (every year)

成績、シンボリズムの発揮
国際化シンポジウム年会

賃貸改善への追一課題――
数学的思考力の育成

Numeracy in Education for All is "mathematical literacy for living" in OECD-PISA. It is a necessary ability for individual development, T. J. Koballa, Director of PISA, IEA, OECD-PISA 調査に見る生きるために必要な数学者能力です。開発途上国の人々が自立するための必要な能力です。 Max Stephens
- C. Developing Integrated Models
世界のための統合モデル
実現的・システム化したモデル・教材の開発
 - Product 5. Integration of Experiences
日本と他の国々の経験統合
Japanese Lesson Study, A
Mathematics at a Glance
Heightening the power of printing
研究発表(日本語) (2010年2月)
 - Product 6. Web site
成績、シンボリズム等、
<http://www.kyoto-u.ac.jp/math/>
 - Product 7. VR for Lesson Study
授業研究用VR
実現的・個別能力モデル
教材の開発

 - Product 8. Experience of Teacher Education in Developing Countries
開発途上国における教員教育実験
実現的・個別能力モデル
教材の開発


万人のための教育Education For All:

the World Education Forum, Dakar, Senegal, 26-28 April 2000

(i) expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children;

(ii) ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality;

(iii) ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programmes;

(iv) achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults;

(v) eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality;

(vi) improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.

算数は教えない限り身につかない。経済生活も、生産もままならない。

Innumeracy への挑戦

Numeracy, 数学的識字力

性別	人
男子	約 35,000
女子	約 30,000
合計	約 65,000

性別	人
男子	約 30,000
女子	約 25,000
合計	約 55,000

男子
女子
合計

EARTH GEOMETRY

- Definition of Latitude, Longitude and great circles.
- Latitude - parallel lines of latitude are great circles that divide the Earth into 90° North and South.
- Longitude - meridians of longitude are great circles that divide the Earth into 180° East and West.
- Distance between two points on the Earth's surface.
- Formula: $S = \pi R^2$
- Radius of the Earth: $R = 6371 \text{ km}$
- Surface area of the Earth: $A = 4\pi R^2$
- Volume of the Earth: $V = \frac{4}{3}\pi R^3$
- Surface area of a sphere: $S = 4\pi r^2$
- Volume of a sphere: $V = \frac{4}{3}\pi r^3$

Earth Geometry

- Definition of Latitude, Longitude and great circles.
- Latitude - parallel lines of latitude are great circles that divide the Earth into 90° North and South.
- Longitude - meridians of longitude are great circles that divide the Earth into 180° East and West.
- Distance between two points on the Earth's surface.
- Formula: $S = \pi R^2$
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- Volume of a sphere: $V = \frac{4}{3}\pi r^3$

By Todo



- The basic teaching style in American mathematics classrooms remains essentially what it was two generations ago.
- Japanese approach is a natural outgrowth of the teaching culture in Japan, which accords teachers not only abundant time for preparation, but also for collaborative lesson planning.
- Fully 99% of all elementary teachers and 50% of all middle school teachers participate in lesson study groups that meet for two to five hours per week.
- The debilitating professional isolation of U.S. teachers stands in stark contrast to this pattern.
- A *core conclusion from the videotape research*: "The key to long-term improvement [in teaching] is to figure out how to generate, accumulate, and share professional knowledge."

米国における日本型授業研究, by Catherine Lewis

授業研究は、教材がわかつていな
い先生どうしでもできる。わかつてい
ない問題に挑戦して、その授業計画
を立てる中で学びわかっていく。

**Lesson Study in North America
Progress and Challenges**

Catherine Lewis
Mills College Lesson Study Group
Oakland, California
<http://www.lessonresearch.net>

ある先生の感想:
「授業研究に取り組むまでは、多重
知能や構成主義について話し合っ
たけど、個別教材について話し
合ったことはなかったわ。授業研究
に取り組むようになって初めて教材
について話し合ったし、なぜ教える
のか、どう教えるのか、子どもが何
を学んだか話をすりやになったわ。」

ある先生の感想:
「私の子どもを見る目が育ったわ。今は、授業について責任を
感じるわ。他の先生と授業研究に取り組むようになって、オープンエンドの問
題など、挑戦的な授業を好むようになったわ。子どもがそのような難しい問題
に取り組む様子をみることで、私は自分の授業に自信を持てるようになったわ。」

成果物: 図で見る日本の授業研究

Samples of Japanese Lesson Study

New ways of calculation
Yasuhiko HOSOMIZU
Grade 3, 9 years old.
Attached Elementary School
of University of Tsukuba

授業研究その歴史

昔の教室の写真

Children devise with their own study questions and write them on small chalkboards in the school hallway.

The boards are hung in the classroom to present the proposed ideas.

よい授業とその指導案

Kono Toshotsu

Specific goal: Impact the diversity of ideas and the fun of learning through an open-ended approach

Study topic: Solid figures learned by expressing different projected diagrams

1) Cube Solid Figures

To develop students' understanding of basic solid figures through activities such as making and constructing figures, and to enable them to understand and discuss the structural components of a figure and their relative positions.

2) Teaching Materials

The teaching materials shown above focus on areas that involve solid figures, which are learned using two-dimensional figures. The textbook uses a typical unfolded diagram to guide activities for expressing solid figures as two-dimensional figures, and activities for making solid figures from a unfolded diagram. Activities include: 1) Unfolding a solid figure; 2) Drawing a solidified diagram and discussing your designs.

3) Unit Lesson Plan (sample)

(After the teaching order within the unit)
Class and Activity: "Unfolded Diagram of a Solid"
4) Student Document (sample)

Developing Creative Teaching Strategies

ACTIVITY	PURPOSES
Based on the teacher's activity of unfolding a solid figure, students express the designs they have made.	• Imaging students' activity
Problem Solving for students	• In the process, students find various ways of solving difficult problems and sharing difficulties that they may have.
Sharing	• Let's them know about trial and error approaches.
Sharing	• Comparing developed various designs after cut out one cylinder.
Sharing	• Comparing with experience of students and learning the experience of others based on reflection experiences.

VTRを利用して何が学べるか?

"New ways of calculation":
A 3rd grade mathematics lesson, by the teacher Yasuhiko Hosomizu
Attached Elementary School - University of Tsukuba
Commented by Akademie Arcari

The type of this third grade lesson is around the calculation of a series of multiplications of two-digit numbers, 50 and 60, in which they can add up to 10, 250, 240, 2520, 2820. On the basis of such calculations, the goal of the lesson is to engage students in noticing patterns, finding an easier algorithm to perform the calculations, forming a rule for such situations, and applying it to other cases. The new rule that the students supposed to find is the result of such multiplications will be 600 plus the result of the multiplication of the two unit digits (e.g. 24x20=480+24). The rule can be easily formulated and justified by the teacher.

(20 + a)(20 + (10 - a)) = 600 + a(10 - a). Obviously, third grade students lack these tools. Therefore, in order to produce and/or understand an explanation, they will have to resort to numerical methods. The teacher, in his/her role as a researcher (and not as a teacher), (as part of the lesson study), says that he is aware that third graders also lack the tools fourth graders have, such as the area model (see figure 1, below, in which the square represents 20x20, the two larger rectangles together represent 20x10 and the smaller rectangle represents the product of the units).

Figure 1

¹ On the basis of an 11 minute video (of parts of the lesson) edited by the CRICED at the University of Tsukuba

What are the characteristics of the classroom management of this teacher?
Many teachers tend to say that the potential benefits of classroom discussions of mathematical ideas, however such discussions may present several dilemmas for the teacher. For example, the goal of the discussion is that students present their own ideas, and the teacher has to facilitate the discussion so that students can check their correctness, to present alternatives and to collectively produce knowledge. However, if the brightest students present advanced ideas, the teacher may feel that the other students will not be able to engage in a conversation with them. The teacher's concern is to be as inclusive as possible, and that may require special ways of handling the discussions by giving the right to speak to different students, by encouraging them to justify their reasoning, by requesting clarifications from students about other students' ideas, and by avoiding early value judgments about correctness. Managing such discussions requires skill and experience.

Is there more mathematics at stake in this problem, of which the teacher should be aware of?
This teacher seems to think that the teacher expected another mathematical outcome, for example that the result of a multiplication of two numbers which add up to 50, is 625 means the square of the difference of the numbers from 25. It is indeed finding a rule that the third graders can apply to other cases. Nevertheless, what about considering mathematical implications and ramifications of the mathematics underlying the task, even if those are very unlikely to emerge in the class?

What may be the learning outcomes and the follow-up for such a lesson?
From a video, it is difficult to know what students learned. It would be interesting to analyze the different kinds of follow-up teachers may plan for such a lesson, including the possibility of not following it up directly and immediately.

