

## **Role with new ICT equipment in mathematics class** **Basic scholastic attainments by use of “Nintendo DS classroom”**

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*This is a case study of the practice using by the game consoles . This game consoles is popular and familiar with students. The advantage of the game terminal developed to the lesson and a result are reported. [Keyword] Nintendo DS , the basic foundation, re-learn*

### **1. Background**

In the advanced information society, PC, Tablets, Smartphone and etc. are very popular now. And at school, not only personal computers in a computer lab but also digital textbooks, digital terminals for each students or a digital blackboard are used in a usual classroom. There are two aims for education by using technology, one is to develop creativity through mathematical activities and another one is to improve basic skills and knowledge. CAI (Computer Assisted Instruction) system had been used to improve basic education in a PC laboratory. And much software has been developed to help mathematical activities.

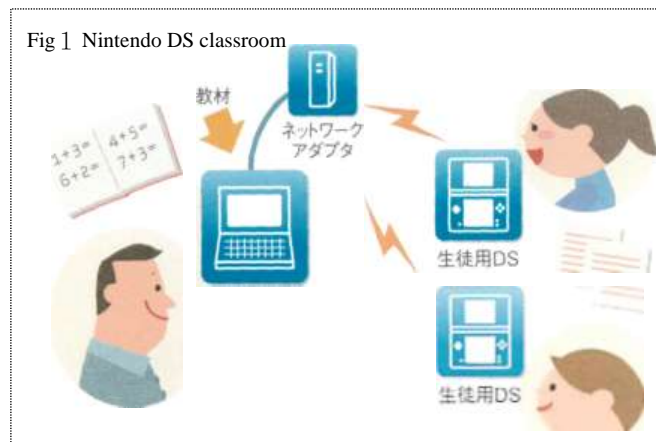


Nintendo DS Classroom system is developed based on “Interactive Study” studied by researchers and school teachers for helping each student to learn as to their ability and developed by SHARP SYSTEM PRODUCTS CO.

Needless to say, the DS is a game machine that is extremely popular among children. It can be used not only to play games, but also to develop our brains through programs like “Brain Training”. 100 cell calculation grids are a popular calculation training tool I elementary schools in Japan. (Hyaku Masu Keisan (Hundred-Square Calculations), a method of learning through repetition conceived by Kageyama Hideo) They are popular because they not only help students to improve their ability to make calculations, but also improve the student’s concentration. For these reasons, it is easier to get students to enjoy the class and interested in learning if we use modern tools, such as the Nintendo DS, rather than trying to think of new teaching techniques and updating out textbook.

## 2 · An Environment of DS Classroom

Nintendo DS Classroom is the system which connected teacher's PC with the game terminal in which the student gets used and is familiar by LAN. (cf. Fig1) As for this system, individual answer and opinion recovery are performed by exchange of a terminal and PC. The making questions is a deed with PC for teachers, the advance situation and the situation of corrigenda of an exercise can be grasped immediately. This terminal can be utilized as a small whiteboard. Therefore, we can collect views for answer. Especially this terminal demonstrates an effect for repetitive study of calculation, or the rote learning of a word.



To the expectations for the DS as a result of this lesson is the next point.

- ① Understanding in the classroom can take advantage of real-time answers to problems
  - ② The exercises done on the problem through digital materials can be grasped the student situation rather than with a paper and pencil.
  - ③ Students can get the feedback immediately after their work. And the educational materials (the principle of small steps) are arranged to be able to promote each understanding.
  - ④ When individual learning, the study will be conducted in accordance with their level of understanding and speed.
  - ⑤ In the iterative learning materials for fixing can be expected.
- And so on. Case Study in math class and so far below describes the benefits and effects.

## 3. Case Study

The lesson which utilizes DS was utilized through one year to the tenth grade student in 25 persons' class.

In case you use in math class is as follows.

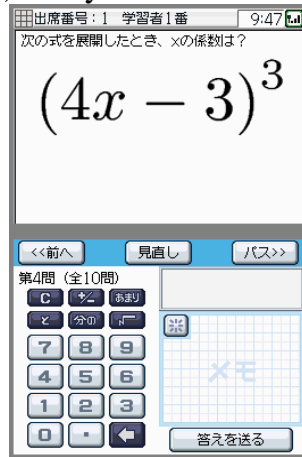
- 1) Polynomial
- 2) Square roots
- 3) Determine the solution
- 4) Quadratic function
- 5) Sine theorem
- 6) Cosine Theorem

7) Area of a triangle

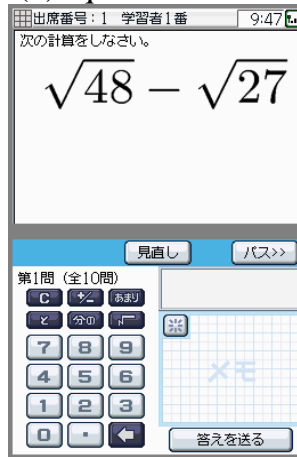
8) Logarism

In each area, provide about 50 questions about the problem and dealt with in an hour. For example, the screen capture of a typical problem is shown as follows.

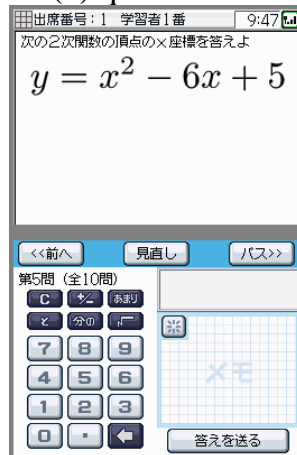
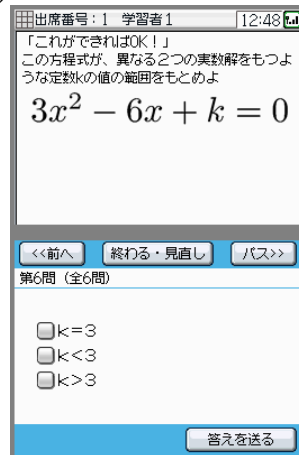
(1) Polynomial



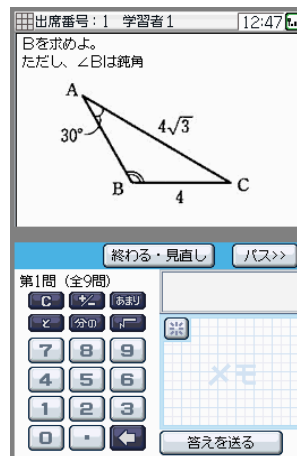
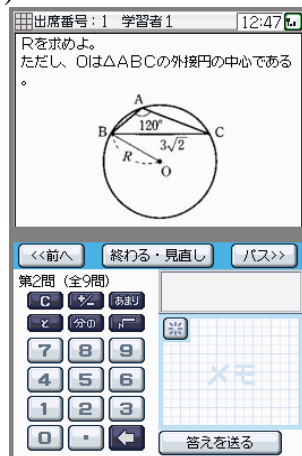
(2) Square roots



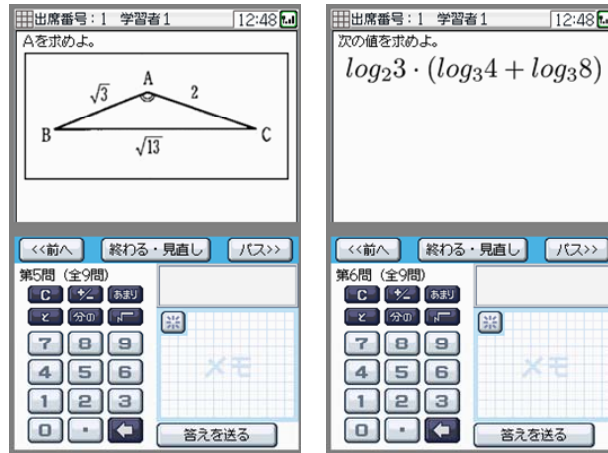
(3) Determine the solution (4) quadratic function



(5) sine theorem



(6) Cosine Theorem (8)logarism



3. Result ( An advantage and an effect)

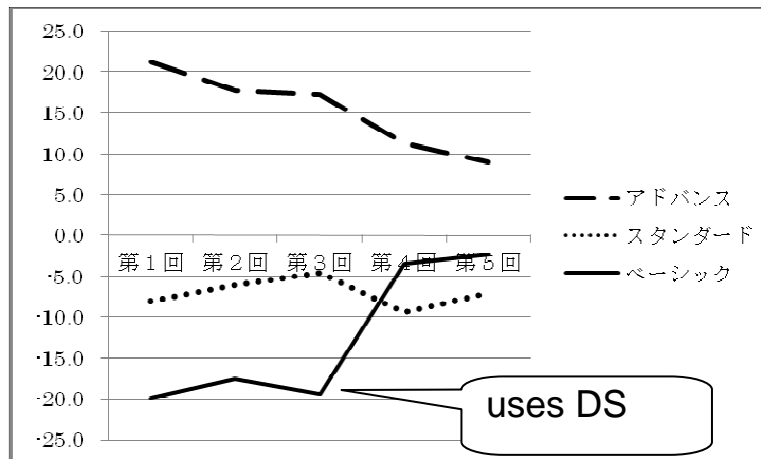
The class which utilized DS through every year is a "basic" class.

In the study achievement test of the time of admission, this class is a group belonging to the lowest.

The scale of the organization according to skill level is composing 80 students in three groups.As a feature of the student who belongs to this class, when having stumbled in the school stage before a high school, or when there is a domain , the student who cannot go into study of the mathematics of a high school smoothly is included.

In particular, it needed to learn in creation and arrangement of teaching materials, and needed to take repair teaching materials into them. Next Graf is results transition of the annual fixed examination in a mathematical lesson.

The difference of the average mark of the mathematical fixed whole examination and the average mark in each class of an "advance", a "standard", and the "basics" is displayed by Graf.



Although the difference from the average mark of the basic class of the solid line was -20 point in the 1st examination, it turned out in the 5th examination at the end of a fiscal year that the score is extended to the neighborhood to the average mark.

## 4 Conclusion

I did the lesson of DS practical use and felt that many of the practice or researches on practical use of technology in education had not taken up the viewpoint of the calculation power for mere memorization, and concentration training with emphasis on practical use of creativity training for an understanding of teaching materials.

What is called computer assisted learning, such as repeating, solving the study which aims at fixing of the basic foundations by the study like a drill, and the knowledge problem for qualification acquisition, and fixing them, and e-learning should be utilized more easily. It is thought that it was cheap and the time when a highly efficient terminal plays the role came.

## References

KAKIHANA Kyoko(2011) “ The Future of the Use of Technology in Math Education 2 ~ For Developing Creativity and For Mastering Basic Knowledge and Arts ~ “ Proceeding of 35<sup>th</sup> Annual Meeting of Japan Society for Science Education. pp74-75

↓ the screen of the host computer

The screenshot shows a web browser window displaying a DS classroom interface. The title bar indicates the date and time as 11月 8日 (月) 午前 9:44. The main content area is titled "ニンテンドーDS 教室" and includes a navigation menu with "終了して授業メニューへ". The interface shows class information: "クラス: 1CD (basic)", "先生: 末廣 数1", and a "生徒DS管理" button. The main section is "テスト 解答状況" with a "制限時間: 無制限" indicator. Below this is a table titled "解の判別(Level 1)" showing test results for 20 students. The table has columns for "名前", "正解数", and four columns of question counts (5, 10, 15, 20). Each cell in the question count columns contains a grid of blue circles (correct) and red crosses (incorrect).

名前	正解数	5	10	15	20
1	13/20	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×
2	17/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ × ○ ×
3	20/20	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○
4	10/20	× × × × × × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×
5	10/20	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×
6	20/20	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○
7	18/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ × ○ ×
8	7/20	× × × × × × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×
9	19/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○
10	10/20	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×	○○○○○ × × × × ×
11	7/20	× ○ ○ ○ ○	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×
12	18/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ × ○ ×
13	9/20	× × × × × ○ ○ ○ ○ ○	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×
14	18/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ × × × × ×
15	9/20	○○○○○ × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×
16	17/20	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ × ○ ×
17	13/20	× ○ ○ ○ ○	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×
18	18/20	× ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ × ○ ×
19	5/20	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×	× × × × × × × × × ×
20 学習者 2 0	11/20	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○	○○○○○ ○ ○ ○ ○ ○