On computer education in Japan

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Abstract: In recent years, the number of university classes using computers has increased with the widespread availability of computers. In Japanese universities as well, computer and intramural information networks have developed rapidly. Many Japanese college students take "computer literacy" classes and learn the basic methods of E-communication, for example, how to send E-mail, protect personal information, and so on. In spite of this, however, the so-called "digital divide" is still a serious problem.

In this study, present and past data on computer learning were compared, using Mathematica and principal component analysis, in order to understand the present condition of computer education in Japan. In particular, it seems that introduction of the computer education in elementary and junior high schools will have a big influence on university education. And it seems that the personality and character of the individual influence the level of computer mastery.

Keywords: Computer education, Mathematica, principal component analysis

1 Introduction

In recent years, the number of university classes using computers has increased with the widespread availability of computers. In Japanese universities as well, computer and intramural information networks have developed rapidly. Many Japanese college students take "computer literacy" classes and learn the basic methods of E-communication, for example, how to send E-mail, protect personal information, and so on.

The number of students who have a personal computer at their home has been increased. Moreover, a lot of students have been had a cellular phone since low teenaged and they send E-mails and images by cellular phone in daily. So, they are experienced in E-communications. But, all of the students can not always master computer programming and understand the mechanism of computers. Student's ability of programming is getting worse year by year.

On the other side, it was reported that students of Japanese universities are poor at scholar of mathematics rather than the past. They are weak in mathematical proof problems, especially.

The main theme of this study is the suggestion for the most effective teaching method of computer learning. The data on computer learning were taken in the first grader of some university in Japan in order to understand the present condition of computer education. This data may be divided two types. The first type is a questionnaire for personal character and their present and past skills for computer and

mathematics. The second is grades of the first semester for computer and classes. This data explained why they are poor at computer learning and mathematical proof solving.

First of all, it was investigated that the personality and character of the individual influence the level of computer mastery. Second, the scatter plot which has three axes indexed with three records, test of linear algebra, reports of mathematical exercise and computer class, was plotted by Mathematica (Wolfram, 1999) in order to focus on the target group in this study.

2 Data

This data has taken by university in Tokyo. Number of students attended this class was 92. 90 persons among 92 persons obtained the reply. 82 men and eight women replied to the questionnaire. Next, the contents of questionnaire data are explained. The data consist of two kind of type. First part was asking about computer and math skill. First part includes asking about strong subject and a poor subject question. Also, favorite mathematical subject and about the computer in everyday life. Second part was asking for human stereotype.

First, the authors explain about the class, which the student has taken. This lesson name is called "Computer and Computing 1", and it is a first grader's compulsory subject. If a student does not pass this class, they cannot graduate from this school. Therefore, the student who dropped this class at freshman year has to take this class again next year. There are two major goals in this class. The first goal is that a student understands the structure and the basic principle of a computer. Moreover, a student masters the structural knowledge of a computer. The second goal is that a student studies the computer utilizing method. Having taken the questionnaire in this class has a meaning. First, the attendance student of this class is mainly a freshman. Therefore it is easy to get results of admission test. Second, easy to see the result after a class because a student has not learned the special computer class before. The purpose of this research is “the relationship of a student's strong subject and computer acquisition" and "the relationship of human stereotype and computer acquisition". Therefore, the authors thought that the data, which fits this research in this class, could be taken.

3-1 Analysis

The Internal-External Scale data and knowledge or contact of computer data was analyzed using the principal component analysis. Principal component analysis is popular technique for reduction the number n of the input variables (Bonifas, Escoufier, Gonzalez and Sabatier, 1984; Vines, 2000). The aim is to derive p linear combinations of the original variables, called principal components that summarize the information contained in the data (Rao, 1964; Tanaka and Mori, 1997). This can be achieved by taking those p components that successively have maximum variance (Mori, Iizuka, Tarumi, and Tanaka, 2000). The principal component analysis was first used identify the major variables that account from the variations in Internal-External Scale scores (Rotter, 1966). The factors and

corresponding variables are Factor 1: Efforts; Factor 2: Prudence; Factor3: Confidence.

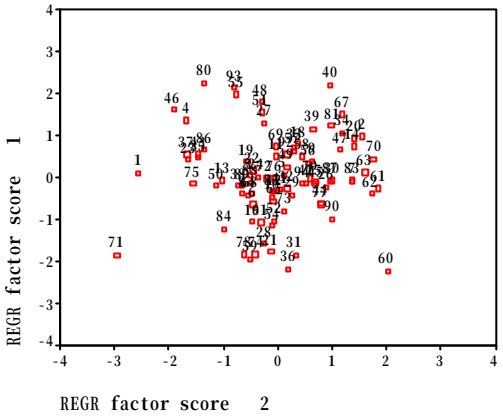


Figure 1:Factor1 and Factor2

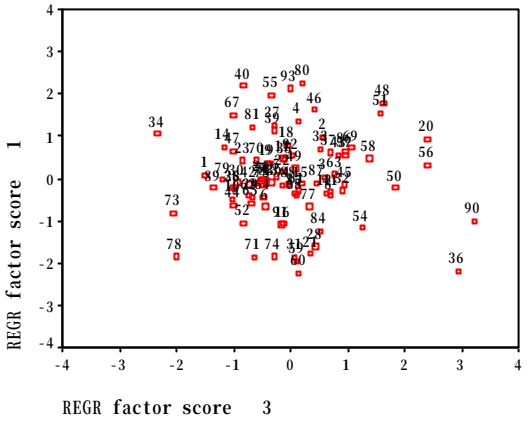


Figure 2:Factor1 and Factor 3

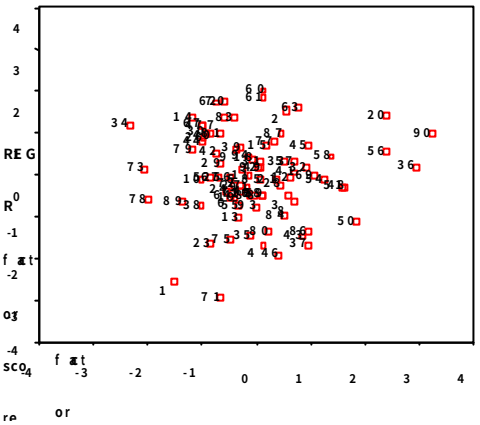
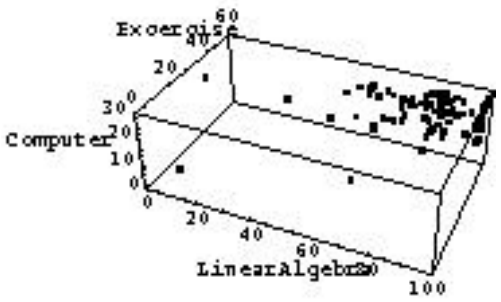


Figure 3: Factor 2 and Factor3

These plots show each student. From the result, the persons with the ordinary result of a test are scattered on all axes. The person with the bad result of a test solidifies in 0 or a minus axis. From the factor 2 of “Prudence”, those who are in 0 or a minus axis not prudent cannot do the subject in a lesson, and are not so high-achieving.

3-2 Analysis

This analysis concentrates on the correlation between skills for computer learning and abilities of mathematics. The scatter plot which has three axes indexed with three records, test of linear algebra, reports of mathematical exercise and computer class, was plotted by Mathematica in order to focus on the target group in this study. Figure 5 shows that the correlation between skills for computer learning and abilities of mathematics, especially. This plot indicates that students are divided two groups, whether good learner or not in a computer class. The target group of this study is under 23 computer's grade.



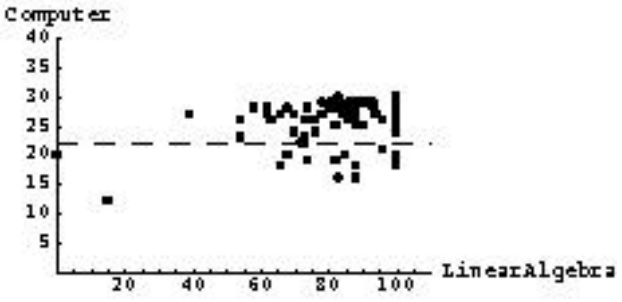


Figure4: The scatter plot of three grades Figure5: Grades of linear algebra and computer

4 Conclusion

Reflection on some of these will make it clear that computer skills have nothing to do with environments of learners. According to this study, the most of dull students in computer leaning have their computer at their home, and learned about computer at classes of high school. Why their grades are not so good? They have not well at mathematics score. But it is not definitely. It is the most requisite factor for computer masterly that leaner pay attention to teacher's instruction.

It is the effective computer education in elementary that listening to instructions rather than giving personal computers at home.

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