
**Analysis of Variance for Eight 1993 YCCI School Sites
Technical Report 93.3 (August 1993)**

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Introduction

This report is a summary of findings from 1993 data gathered at eight school sites on the Young Children's Computer Inventory (YCCI). Its purpose is to: 1) describe major effects that were found in the 1993 data with respect to computer use vs. non-use and national/cultural differences, and 2) compare 1993 findings with data gathered in previous years.

Subjects

The subjects were 748 students in grades 1-4 at eight school sites in Japan and the United States of America (USA). The total number of students participating at each school site is listed in Table 1. Subjects at each school site were nearly equally distributed across the four grades. Pseudo-random stratified sampling by grade was used at sites 101, 304, and 305. Only bilingual-program students were selected at site 604. All students in grades 1-4 were included at the other sites.

Instrument

The Young Children's Computer Inventory was used to record children's attitudes and perceptions in this study. The YCCI measures children's psychological dispositions (prevailing attitudes) in six areas (Miyashita & Knezek, 1992; Knezek & Miyashita, 1993):

Computer Importance (I)	Computer Enjoyment (J)
Motivation/Persistence (M)	Study Habits (S)
Empathy (E)	Creative Tendencies (C)

The subscale structure for the 48 items of the questionnaire is provided in Appendix A. A detailed explanation of the YCCI's derivation and its various versions is provided in the YCCI Handbook (Knezek & Miyashita, 1993).

Procedure

Forms were administered during March-April, 1993 at all sites. At sites 101 and 604, each teacher individually led all students in his/her class, item by item, through the form, allowing every student to circle a response before proceeding to the next item. This procedure required 20-40 minutes per class. At all other sites, forms were sent home with the students and parents aided their children in completing the forms, as necessary.

Data Analysis

The data were analyzed using the ANOVA (Analysis of Variance) routine of the Statistical Package for the Social Sciences (SPSS) on a Macintosh IICI computer.

Results

ANOVA results are listed in Table 2. Highly significant ($p < .00005$) differences were found to exist among the eight sites on all six subscales. Scheffe's multiple-range test for post-hoc comparisons between all pairs of sites was used to determine precisely which sites were unusual on each subscale. The level of significance selected was .01. The significant contrasts found were:

1. Computer Importance. The Japanese public school without computers (305) was significantly lower than the U.S. public school with computers (101), the U.S. private school with computers (104), the Hawaii pseudo-public school with computers (109), the Hawaii Japanese advancement school (202) and the Texas bilingual Hispanic school with computers (604).

In addition, the Texas bilingual Hispanic school (604) was significantly higher than the Japanese public school with computers (305), the Japanese public school without computers (304), the Texas Japanese advancement school (201), and the Hawaii Japanese advancement school (202).

2. Computer Enjoyment. The Japanese public school without computers (305) was significantly lower than the Japanese public school with computers (304), the Texas public school with computers (101), the U.S. private school with computers (104), the Hawaii Japanese advancement school (202) and the Texas bilingual Hispanic school with computers (604).
3. Motivation/Persistence. The Texas bilingual Hispanic school (604) was significantly higher than the Texas private school with computers (104) and the Japanese public school with computers (305).
4. Study Habits. The Japanese public school with computers (304), the Japanese public school without computers (305), the Texas Japanese advancement school (201) and the Hawaii Japanese advancement school (202) were all significantly lower than the U.S. public school with computers (101), the U.S. private school with computers (104), the Hawaii pseudo-public school with computers (109), and the Texas bilingual Hispanic school with computers (604). In addition, the Japanese public school without computers (305) was significantly lower than the Texas Japanese advancement school (201), and the Texas public school with computers (101) was significantly lower than the Texas bilingual Hispanic school (604) with computers.

5. Empathy. The Japanese public school with computers (304) was significantly lower than the U.S. public school with computers (101), the U.S. private school with computers (104), and the Texas bilingual Hispanic school with computers (604).
6. Creative Tendencies. The Texas bilingual Hispanic school (604) was significantly higher than the Japanese public school with computers (305), the Japanese public school without computers (304), the Texas Japanese advancement school (201), the Hawaii Japanese advancement school (202), and the U.S. private school with computers (104).

In addition, the Texas public school with computers (101) was significantly higher than the Japanese public school with computers (305), the Japanese public school without computers (304), the Texas Japanese advancement school (201), and the Hawaii Japanese advancement school (202).

Discussion

The results generally concur with the findings from the 1991 and 1992 data. As reported in the ANOVA results above, and as shown graphically in Figure 1, the Japanese public school without computers (304) is far below the Japanese and non-Japanese schools which used computers, on Computer Importance and Computer Enjoyment. This is strong reconfirmation of the positive impact of computer use in school on these two psychological dispositions.

The effect of computer exposure on Computer Importance and Computer Enjoyment does not appear to be identical for the two, however. Increased Computer Enjoyment seems to be a simple function of meaningful computer exposure, without cultural rating biases, while more positive Computer Importance is a function of computer exposure but dampened by culture or rating bias for Japanese subjects. These trends are illustrated by the two-clusters (for computer use vs. non-use) for Computer Enjoyment versus three clusters (for U.S. with computers versus Japanese with computers versus Japanese without computers) for Computer Importance shown in Figure 1.

Ratings for Empathy seem to be a simple function of Western versus Eastern culture, independent of computer experience. This is shown by the two very tight clusters for Empathy in Figure 1, where Japanese with and without computers are in the same cluster.

Likewise, ratings for Study Habits appear to be a function of Western versus Eastern culture, due the same kind of partitioning described for Empathy. However, there is much more variation within clusters for Study Habits, so other effects besides culture may be present as well.

Ratings for Creative Tendencies appear to divide along Western versus Eastern cultural lines, rather than extent of computer use. One interesting anomaly for this category is that of the Texas private school with computers (104), which lies in the “Eastern” cluster rather than the “Western” cluster. It is hypothesized that this may be due to the significant numbers of children born in Asia who are attending this school system.

One other question targeted for the 1993 data is clearly answered in Table 2 and Figure 1. The response profile for the Texas Japanese advancement school (201) is very similar to that for the Hawaii Japanese advancement school (202), and these two schools were not significantly different from each other on any of the six dispositions measured. This indicates that Japanese children living in America are a homogeneous group, regardless of geographic location, just as Miyashita (1994) found to be true for Japanese children living in different locations/environments in Japan.

References

- Knezek, G., & Miyashita, K. (1993). Handbook for the Young Children’s Computer Inventory. Denton, TX: Texas Center for Educational Technology.
- Miyashita, K. T. (1994). Effect of computer use on attitudes among Japanese first- and second-grade children. Journal of Computing in Childhood Education, 5(1), 73-82.
- Miyashita, K. & Knezek, G. (1992). The Young Children’s Computer Inventory: A Likert Scale for assessing attitudes related to computers in instruction. Journal of Computing in Childhood Education, 3, 63-72.

Table 1
Distribution of Subjects by School

School	Type	Subjects	Form
101	U.S. (Texas) Public with Computers	132	English
104	U.S. (Texas) Private with Computers	98	English
109	U.S. (Hawaii) Pseudo-Public with Comp.	23	English
201	U.S.-Japanese Advancement in Texas	88	Japanese
202	U.S.-Japanese Advancement in Hawaii	153	Japanese
304	Japanese Public with Computers	102	Japanese
305	Japanese Public without Computers	91	Japanese
604	U.S. Bilingual Hispanic with Computers	61	Spanish

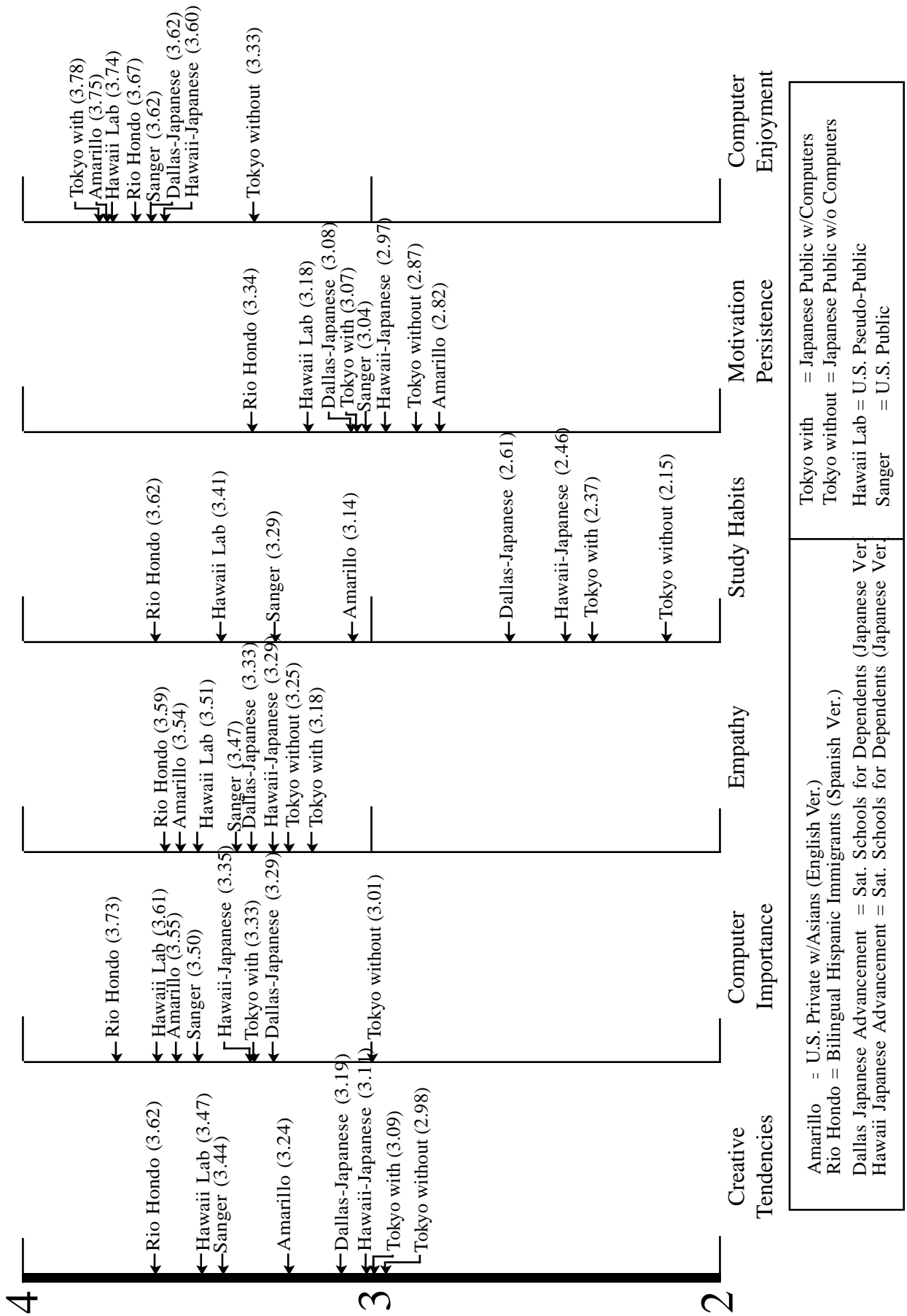
Table 2
Means, SD's, & ANOVA Results for 8 School Sites
1993 YCCI Data (4-Point)

Site	Computer Importance	Computer Enjoyment	Motivation/ Persistence	Study Habits	Empathy	Creative Tend.
Sanger School 101 (n=132)	3.50 (.55)	3.62 (.51)	3.04 (.57)	3.29 (.54)	3.47 (.43)	3.44 (.48)
Amarillo School 104 (n=98)	3.55 (.45)	3.75 (.35)	2.82 (.71)	3.14 (.52)	3.54 (.44)	3.24 (.54)
Hawaii Lab School 109 (n=23)	3.61 (.42)	3.74 (.30)	3.18 (.68)	3.41 (.49)	3.51 (.48)	3.47 (.46)
Dallas-Jpnse School 201 (n=88)	3.29 (.55)	3.62 (.46)	3.08 (.65)	2.61 (.64)	3.33 (.55)	3.19 (.56)
Hawaii-Jpnse School 202 (n=153)	3.35 (.58)	3.60 (.47)	2.97 (.60)	2.46 (.61)	3.29 (.55)	3.11 (.47)
Tokyo w/ School 304 (n=102)	3.33 (.52)	3.78 (.32)	3.07 (.60)	2.37 (.67)	3.18 (.61)	3.09 (.51)
Tokyo w/o School 305 (n=91)	3.01 (.68)	3.33 (.62)	2.87 (.62)	2.15 (.57)	3.25 (.46)	2.98 (.55)
Rio Hondo School 604 (n=61)	3.73 (.36)	3.67 (.40)	3.34 (.52)	3.62 (.38)	3.59 (.27)	3.62 (.26)

Table 2 (cont.)
Means, SD's, & ANOVA Results for 8 School Sites
1993 YCCI Data (4-Point)

Site	Computer Importance	Computer Enjoyment	Motivation/Persistence	Study Habits	Creative Empathy	Tend.
Overall signif.	(p<.00005)	(p<.00005)	(p<.00005)	(p<.00005)	(p<.00005)	(p<.00005)
Significantly Different (p<=.01) Pairs of Sites:	(604 vs. 305,201, 304,202)	(305 vs. 202,101, 604,104, 304)	(604 vs. 104,305)	(104 vs. 604) (305 vs. 201,104, 101,108, 604) (304 vs. 104,101, 109,604) (202 vs. 104,101, 109,604) (201 vs. 104,101, 109,604)	(304 vs. 101,104, 604)	(101 vs. 305, 304) (604 vs. 305, 304, 202, 201, 104)

Figure 1
Combined Ratings: U.S. vs Japan w/Computers vs Japan w/o Computers (1993)



Appendix A. YCCI Items Ordered by Strength of Factor Loadings

Computer Importance

9	I can learn many things when I use a computer.	.68 I
12	I believe that it is very important for me to learn how to use a computer.	.62 I
8	I know that computers give me opportunities to learn many new things.	.60 I
3	I will be able to get a good job if I learn how to use a computer.	.55 I
11	I believe the more often teachers use computers, the more I will enjoy school.	.45 I
6	I would work harder if I could use computers more often.	.41 I
10	I enjoy lessons on the computer.	.33 I

Computer Enjoyment

1	I enjoy doing jobs which use a computer.	.59 J
2*	I am tired of using the computer.	.54 J
10	I enjoy lessons on the computer.	.42 J
5	I enjoy computer games very much.	.38 J
4	I concentrate on a computer when I use one.	.30 J

Motivation/Persistence

16	If I do not understand a problem, I will not stop working on it.	.53 M
22	I think about many ways to solve a difficult problem and I never give up.	.48 M
23	I never forget to do my homework.	.43 M
21	I enjoy working on a difficult problem.	.42 M
17	When I don't understand something, I keep working until I find the answer.	.31 M
15	I study by myself without anyone forcing me to study.	.27 M

Study Habits

24	I like to work out problems which I can use in my life every day.	.57 S
18	I review my lessons every day.	.52 S
19	I try to finish whatever I begin.	.48 S
20	Sometimes, I change my study habits.	.40 S
15	I study by myself without anyone forcing me to study.	.39 S
25	If I do not understand my teacher, I ask him/her questions.	.36 S

Empathy

30	I worry when I see a sad friend.	.64E
26	I feel sad when I see a child crying.	.62 E
29	I feel sad when I see old people alone.	.53 E
27	I sometimes cry when I see a sad play or movie.	.52 E
35	I feel happy when I see a friend smiling.	.50 E
28	I get angry when I see a friend who is treated badly.	.48 E
31	I feel very happy when I listen to a song I like.	.41 E
32	I do not like to see a child play alone, without a friend.	.37 E
33	I feel sad when I see an animal hurt.	.41 E

Creative Tendencies

42	I find different kinds of materials when the ones I have do not work.	.58 C
40	I create many unique things.	.54 C
44	I make a plan before I start to solve a problem.	.54 C
36	I examine unusual things.	.53 C
39	I tend to consider various ways of thinking.	.48 C
37	I find new things to play with or to study, without any help.	.48 C
43	I examine unknown issues to try to understand them.	.46 C
38	When I think of a new thing, I apply what I have learned before.	.45 C
46	I invent new methods when one way does not work.	.43 C
41	I do things by myself without depending upon others.	.58 C
45	I invent games and play them with friends.	.38 C
47	I choose my own way without imitating methods of others.	.43 C
48	I tend to think about the future.	.31 C

* Reversed Item