論文

Analysis of Causal Relationships Between Actual and Preferred Classroom Environment as Perceived by Students of Japanese Colleges and Universities

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ABSTRACT

This paper discusses a plan of curriculum design and improvement that considers various levels of students and their individual needs. Specifically, this study focused on the causal relationships, using structural equation modeling, between the actual and preferred classroom environment as perceived by students in classes at the college and university level. The actual and preferred form of *College & University Classroom Environment Inventory* (*CUCEI*) were both administered to 568 college and university students at psychology classes. Exploratory factor analysis revealed 5 factors extracted from 35 *CUCEI* items: Dissatisfaction, Satisfaction, Innovation, Personalization, and Individualization. In examination of the 5 models fit indices with GIF and AGIF all of these coefficients showed a certain degree of structural validity for these models. The results indicated that the preferred form of each 5 scales was a causal factor of the corresponding actual form of that scale. This suggests that students' strong needs and expectations for learning are indispensable to creating successful actual classroom environments. Also it was shown that the preferred Personalization is a

causal factor of all in actual classes, it means the extent of students' expectations for personal relationship with a teacher or his/her help has effect on students' assessment of their actual classes. That was interpreted as students' independent attitudes toward learning must be a good advantage for them in an actual classroom. If a causal relationship between preferred environment (students' needs) and their cognition toward an actual classes could be identified, then teachers could put this information to practical use, for example, in improving teaching and learning and planning a new curriculum design.

KEYWORDS: college and university classroom environment inventory, actual and preferred environment, class assessment, structural equation modeling

1. Introduction

Japan's higher education system is shifting towards universal access. The ratio of students who go on to higher education has risen to 50%, and it is predicted that the students' academic levels and learning approaches will also become more diversified. Nowadays the practice of students being asked to evaluate their university instruction is becoming common, and the Japanese Ministry of Education (2001) reported that 451 (69%) of universities carried it out. However it was only recently in Japan that the study of classroom research in colleges and universities started.

Previously, meanwhile, numerous studies have involved the effects of socio psychological classroom environments on student outcomes, Fraser, Treagust, & Dennis (1986) have developed the CUCEI (College & University Classroom Environment Inventory) for evaluating instructions at higher education. In use of the CUCEI, Williamson, et.al., (1986) reported that adolescent and adult learners' satisfaction toward their classes had a significant association with all scales of the CUCEI, and on the other hands, none of the CUCEI sub-scales uniquely

explained a significant amount of the variance in the LOC (Locus of Control: Nowick & Strickland, 1973) scores which assesses personal self efficacy among students.

The author (2003) also found the relationship among students' perceptions of their psychological environment in higher education and their achievement, then moreover locus of control. In that study, the CUCEI and LOC scales were administered to 406 university and junior college students, then factor analysis of the CUCEI data revealed five factors; Satisfaction, Innovation, Individualization, Personalization, and Involvement. The results were analyzed using a two-way Analysis of Variance with the CUCEI scores as dependent variables and achievement and LOC scores for each student group as independent variables. Statistically significant differences were found for students' achievement and LOC on Satisfaction. The interaction between the two variables was not statistically significant. It was shown that the high-achieving students felt more satisfaction toward their classes than the low-achievers, and that students with a more internal LOC reported greater satisfaction in the classroom. That was in agreement with major studies on the advantage of students' internal locus of control at school (ex., Printrich & DeGroot, 1990; Rotter, 1983; Trice, 1990). These results suggested that student perceptions of their classes are clearly relevant to individual student characteristics.

In light of these findings, Ishikawa & Hirata (2003) discussed a plan to improve design of teaching and learning, taking into account students' academic level and learning needs. Specifically, they investigated the use of class assessment scale for measuring students' needs in a college and university setting. Results from the actual and preferred forms of CUCEI were analyzed using analysis of variance and

chi-square.　Their results suggested that within students' respective classes, statistically, their needs differ significantly, even for the same subject with the same teacher.　In addition, there were various different groups with different needs in a classroom.　Further analysis found that the scores of evaluation for the actual class by students related with the level of students needs.　These results suggested that it is quite beneficial to measure students' learning need, not only for improving design of teaching and learning, but also analyzing the results of class evaluations more precisely.

　　The purpose of this paper is to discuss a plan of curriculum design and improvement that considers various levels of students and their individual needs.　Specifically, this study focused on the actual and preferred classroom environment as perceived by students in classes at the college and university level.　The present study is significant because most previous research in this field has been correlational, whereas our study focused on causal relationships between the actual and preferred classroom environment.　If a causal relationship between preferred environment (students' needs) and their cognition toward an actual classes could be identified, then teachers could put this information to various practical use, for example, in improving teaching and learning, planning a new curriculum design, and so on.

2. Methods and Procedures
2.1. Instrument

　　According to Moos's (1974) schema, there are three basic types of dimension for classifying socio psychological human environment.　These three dimensions are Relationship Dimension, Personal Growth Dimension, and System Maintenance and System Change Dimension.

The CUCEI: College & University Classroom Environment Inventory consisted from 7 sub-scales, i.e., Personalization, Involvement, Cohesiveness, and Satisfaction in Relationship Dimension, Task Orientation in Personal Growth Dimension, Innovation and Individualization in System Maintenance and System Change Dimension.

The present study initiated the development of a new instrument for the Japanese context, because research on the use of classroom environment assessments for improving teaching and learning at Japanese colleges and universities is in its infancy. Sako (2002) suggested, in his preliminary investigation of the CUCEI on 10 professors and 38 students, that some items in Personalization, Innovation and Individualization, and all in Cohesiveness was rated as inappropriate for lectures in a large size classroom. As the sample of classes in this study were all of large size (around 100 students), 35 items suitable for lectures in large classrooms were chosen from the CUCEI.

The actual and preferred form of CUCEI were both administered. Items are responded to on a five-point Likert scale ranging from Strongly Disagree to Strongly Agree, as 1=Strongly Disagree, 2=Disagree, 3=neither agree nor disagree, 4=Agree, and 5=Strongly Agree.

2.2. Sample

The sample consisted of a representative group of 568 college and university students in three kinds of psychology classes, namely, "Educational Psychology" and "Mental Health" in teacher-training and nursing courses, and "Environmental Psychology" in a landscape gardening course. All of these all classes were taught by the same instructor. The 104 male and 464 female freshman and sophomore

students from two universities and a college in the Tokyo metropolitan area were involved.

2.3. Validation

Exploratory factor analysis (unweighted least squares methods with oblique/promax rotation) revealed the common five factors from both of the actual and preferred form of CUCEI. The scales are called Dissatisfaction, Satisfaction, Innovation, Personalization, and Individualization (see Table 1 and 2).

Using these five scales with 15 items, a causal relation model between actual and preferred classroom environment was investigated using SEM (structural equation modeling). In Dissatisfaction four items were chosen for SEM via criterion of the factor loading, i.e., "Classes are a waste of time", "This is a disorganized class", "Classes are boring", and "Students are dissatisfied with what is done in the class". Also four items in Satisfaction; "Students enjoy going to this class", "The students look forward to coming to classes", "After the class, the students have a sense of satisfaction", and "Classes are interesting", three items in Innovation; "The instructor thinks up innovative activities for students to do", "The instructor often thinks of unusual class activities", and "Teaching approaches in this class are characterized by innovation and variety" were chosen. Then two items in Personalization; "The instructor helps each student who is having trouble with the work" and "The instructor talks individually with students", then as in Individualization the items; "Students are generally allowed to work at their own pace" and "Teaching approaches allow students to proceed at their own pace" were selected. The results showed that GIF (goodness of fit index) and AGIF (adjusted goodness

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of fit index) values ranged from 0.93 to 0.96, and RMSEA (root mean square error of approximation) was under 0.45 (see from Fig.1 to 5). These coefficients showed a certain degree of structural validity for these models.

Table 1 Factor structure of the Actual form of the College & University Classroom Environment Inventory (CUCEI).*

Item	Scale	Item wording	I	II	III	IV	V	VI
Factor I: Satisfaction								
Q 29	Satisfaction	Students enjoy going to this class	**0.922**	-0.049	-0.082	-0.033	0.028	-0.044
Q 3	Satisfaction	The students look forward to coming to classes	**0.882**	-0.015	0.001	-0.045	-0.032	-0.023
Q 13	Satisfaction	After the class, the students have a sense of satisfaction	**0.834**	-0.026	-0.013	0.030	-0.126	-0.001
Q 34	Satisfaction	Classes are interesting	**0.566**	-0.050	0.006	-0.016	0.022	-0.126
Q 4	Task Orientation	Students know exactly what has to be done in our class	**0.457**	0.045	-0.074	0.147	0.006	0.094
Q 25	Task Orientation	Class assignments are clear so everyone knows what to do	**0.444**	0.005	-0.046	-0.087	0.052	0.100
Q 7	Involvement	Students put effort into what they do in classes	**0.377**	0.077	0.015	0.009	-0.029	-0.081
Factor II: Dissatisfaction								
Q 19	Satisfaction	Classes are a waste of time	0.042	**0.903**	-0.087	-0.077	0.041	0.047
Q 20	Task Orientation	This is a disorganized class	0.096	**0.873**	-0.002	0.018	-0.083	-0.011
Q 24	Satisfaction	Classes are boring	-0.181	**0.746**	0.009	-0.051	0.056	-0.024
Q 8	Satisfaction	Students are dissatisfied with what is done in the class	-0.024	**0.737**	0.022	0.130	-0.104	-0.031
Factor III: Innovation								
Q 15	Innovation	The instructor thinks up innovative activities for students to do	0.026	0.012	**0.795**	0.060	-0.026	0.000
Q 31	Innovation	The instructor often thinks of unusual class activities	-0.012	0.011	**0.750**	-0.157	0.002	0.040
Q 21	Innovation	Teaching approaches in this class are characterized by innovation and variety	0.088	-0.001	**0.549**	-0.043	0.050	-0.051
Q 5	Innovation	New ideas are seldom tried out in this class	0.198	0.076	**-0.726**	-0.014	0.041	0.067
Factor IV: Personalization								
Q 17	Personalization	The instructor helps each student who is having trouble with the work	0.028	-0.066	-0.085	**0.703**	0.004	-0.046
Q 6	Personalization	The instructor talks individually with students	-0.142	-0.089	-0.128	**0.656**	-0.074	-0.001
Q 16	Individualization	Students have a say in how class time is spent	0.043	0.100	-0.006	**0.591**	0.066	0.019
Q 18	Involvement	Students in this class pay attention to what others are saying	0.131	0.073	0.127	**0.348**	0.018	-0.058
Factor V: Personalization (unused for SEM)								
Q 27	Personalization	The instructor isn't interested in students' problem	0.012	0.080	-0.032	-0.039	**-0.691**	-0.013
Q 33	Personalization	The instructor is unfriendly and inconsiderate towards students	0.093	0.019	0.087	0.007	**-0.840**	0.047
Q 28	Involvement	There are opportunities for students to express opinions in this class	0.056	0.049	0.051	0.251	**0.311**	-0.072
Q 1	Personalization	The instructor considers students' feelings	0.301	0.037	0.069	0.040	**0.302**	0.138
Factor VI: Individualization								
Q 10	Individualization	Students are generally allowed to work at their own pace	0.021	-0.051	-0.040	-0.017	-0.043	**0.757**
Q 26	Individualization	Teaching approaches allow students to proceed at their own pace	-0.051	0.029	0.009	-0.046	0.016	**0.682**

* Factor analysis in unweighted least squares methods with oblique/promax rotation

Table 2 Factor structure of the Preferred form of the College & University Classroom Environment Inventory (CUCEI).*

			Factor Loadings				
Item	Scale	Item wording	I	II	III	IV	V
Factor I: Dissatisfaction							
Q 19	Satisfaction	Classes are a waste of time	0.940	0.001	0.049	-0.002	0.004
Q 24	Satisfaction	Classes are boring	0.932	-0.061	-0.016	0.085	-0.013
Q 33	Personalization	The instructor is unfriendly and inconsiderate towards students	0.917	0.075	-0.003	-0.026	-0.030
Q 20	Task Orientation	This is a disorganized class	0.902	-0.039	0.001	0.041	-0.026
Q 8	Satisfaction	Students are dissatisfied with what is done in the class	0.848	-0.066	-0.002	0.057	-0.058
Q 27	Personalization	The instructor isn't interested in students' problem	0.833	0.157	-0.040	-0.123	0.056
Q 12	Involvement	Students "clockwatch" in this class	0.758	-0.107	0.089	-0.077	0.000
Q 5	Innovation	New ideas are seldom tried out in this class	0.342	0.033	-0.314	-0.006	0.073
Factor II: Satisfaction							
Q 3	Satisfaction	The students look forward to coming to classes	-0.017	0.922	0.004	0.018	-0.091
Q 4	Task Orientation	Students know exactly what has to be done in our class	0.035	0.811	-0.131	0.142	-0.087
Q 29	Satisfaction	Students enjoy going to this class	0.030	0.797	0.013	-0.073	0.045
Q 34	Satisfaction	Classes are interesting	0.006	0.684	-0.004	-0.143	0.077
Q 13	Satisfaction	After the class, the students have a sense of satisfaction	-0.064	0.682	0.048	0.022	-0.067
Q 25	Task Orientation	Class assignments are clear so everyone knows what to do	-0.031	0.559	0.017	-0.082	0.066
Q 28	Involvement	There are opportunities for students to express opinions in this class	0.066	0.475	0.041	0.136	-0.026
Q 1	Personalization	The instructor considers students' feelings	0.014	0.412	-0.068	0.177	0.202
Q 35	Task Orientation	Activities in this class are clearly and carefully planned	-0.012	0.370	0.186	-0.164	0.142
Q 7	Involvement	Students put effort into what they do in classes	-0.061	0.347	0.195	0.216	-0.106
Factor III: Innovation							
Q 15	Innovation	The instructor thinks up innovative activities for students to do	-0.026	-0.070	0.888	0.010	0.000
Q 31	Innovation	The instructor often thinks of unusual class activities	0.032	0.061	0.828	-0.088	-0.060
Q 21	Innovation	Teaching approaches in this class are characterized by innovation and variety	0.050	-0.003	0.713	-0.042	0.042
Factor IV: Personalization							
Q 17	Personalization	The instructor helps each student who is having trouble with the work	0.011	0.062	-0.125	0.694	-0.024
Q 6	Personalization	The instructor talks individually with students	-0.089	-0.014	-0.088	0.658	-0.014
Q 11	Personalization	The instructor goes out of his/her own way to help students	0.059	0.106	0.121	0.484	0.115
Q 18	Involvement	Students in this class pay attention to what others are saying	0.053	0.197	0.078	0.297	-0.087
Q 22	Individualization	Students are allowed to choose activities and how they will work	0.057	0.048	0.110	0.331	0.194
Q 16	Individualization	Students have a say in how class time is spent	0.031	0.015	0.058	0.371	0.159
Factor V: Individualization							
Q 10	Individualization	Students are generally allowed to work at their own pace	-0.020	0.033	-0.011	0.013	0.853
Q 26	Individualization	Teaching approaches allow students to proceed at their own pace	-0.029	-0.062	-0.019	0.059	0.759

* Factor analysis in unweighted least squares methods with oblique/promax rotation

3. RESULTS

3.1. Causal relationships between Actual and Preferred classroom environment

It was found that the preferred form of each five scales was a causal factor of the corresponding actual form of that scale. The causal coefficients were 0.89 for preferred Dissatisfaction to actual Dissatisfaction (Fig.1), 0.61 for preferred Satisfaction to actual
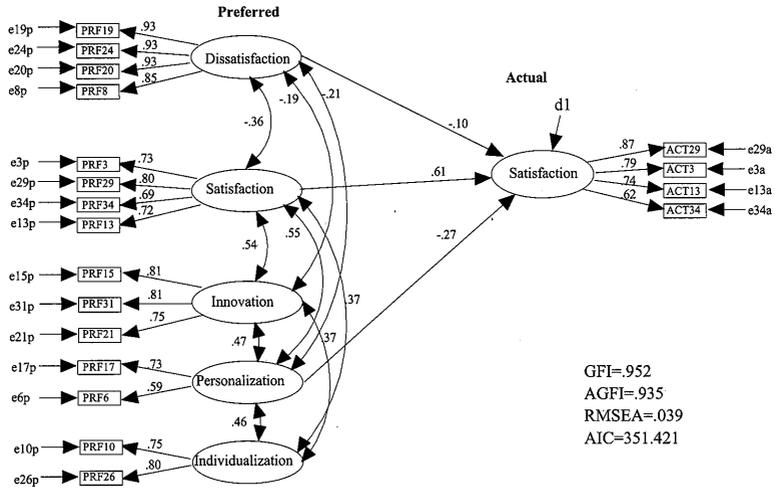
Satisfaction (Fig.2), 0.56 for preferred Innovation to actual Innovation (Fig.3), 0.87 for preferred Personalization to actual Personalization (Fig.4), and 0.34 for preferred Individualization to actual Individualization (Fig.5). Students with a high preference for satisfaction felt more satisfaction toward their classes, and students who preferred little satisfaction evaluated the class as having less satisfaction actually. Similarly higher preference for Innovation, Personalization and Individualization seems to lead students to rate their class higher on these factors. This suggests that high strong needs and expectations for learning are indispensable to creating successful actual classroom environments.
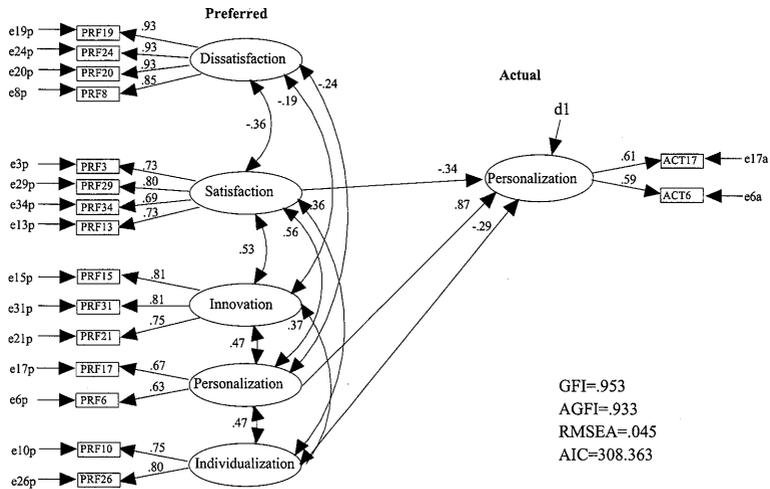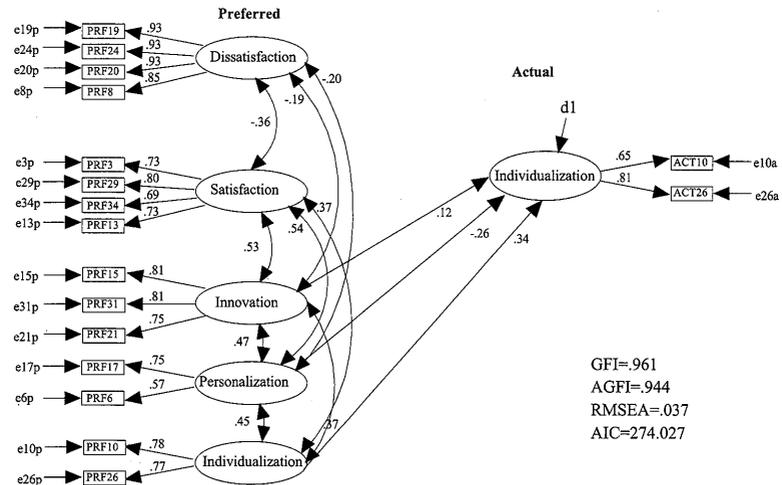

Figure 1 The causal relation model between "Dissatisfaction" in actual and five factors of preferred classroom. All coefficients are statistically significant (p<0.01), except for "Individialization" to actual "Dissatisfaction" (p<0.05).

Figure 2 The causal relation model between "Satisfaction" in actual and five factors of preferred classroom. All coefficients are statistically significant (p<0.01), except for "Dissatisfaction" to actual "Satisfaction" (p<0.05).
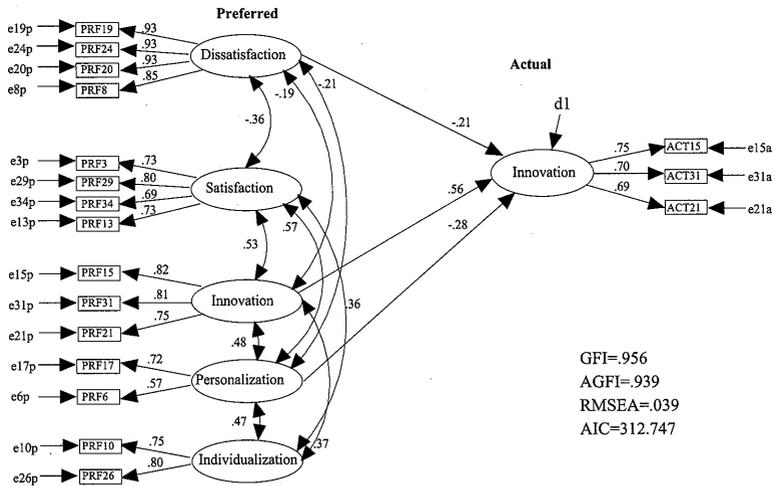
Figure 3 The causal relation model between "Innovation" in actual and five factors of preferred classroom. All coefficients are statistically significant (p<0.01).

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Figure 4 The causal relation model between "Personalization" in actual
and five factors of preferred classroom. All coefficients are statistically
significant (p<0.01).

Figure 5 The causal relation model between "Individualization" in actual
and five factors of preferred classroom. All coefficients are statistically
significant (p<0.01), except for "Innovation" to actual "Individualization"
(p<0.1).

3.2. Point in common with each five models

We have earlier seen the characteristics of each five models separately. It may be also helpful here to see the point in common with these five models of the causal relationship between actual and preferred classroom environment.

To begin with, let us see the outline of the subject classes for the present study, via confidence interval and mean score of all five scales. It is shown in Table 3 that for Dissatisfaction in actual classrooms, the confidence interval was estimated from 1.982 to 2.163, there is a 95% level of confidence associated with this interval (a two-sided confidence interval). The middle scale score is 3.00, then the population mean of Dissatisfaction could be judged statistically lower than that. The mean score of Personalization was also lower, on the other hand, Satisfaction and Innovation mean scores were statistically higher. Thus we see the students were almost satisfied with their class except for the shortage of personal relationship to a instructor. Table 4 indicates that students rated all factors higher (but Dissatisfaction lower) than the middle score (3.00) for their preferred classroom. It follows that the five factors: Dissatisfaction, Satisfaction, Innovation, Personalization, and Individualization were perceived quite desirable by students at learning in a classroom.

Table 3 Mean scale score and 95% confidence interval of the Actual form of CUCEI

Actual	Dissatisfaction	Satisfaction	Innovation	Personalization	Individualization
Mean scale score	2.071	3.837	3.293	2.465	2.965
Upper limit (2.5%)	2.163	3.909	3.366	2.541	3.046
Lower limit (2.5%)	1.982	3.792	3.243	2.395	2.901

Table 4 Mean scale score and 95％ confidence interval of the
Preferred form of CUCEI

Preferred	Dissatisfaction	Satisfaction	Innovation	Personalization	Individualization
Mean scale score	1.802	4.536	3.812	3.722	3.917
Upper limit (2.5％)	1.902	4.610	3.893	3.808	4.001
Lower limit (2.5％)	1.694	4.506	3.758	3.666	3.862

Having observed the outline of the subject classes, one can then
return to the point in common with these five models. Figure 1 and 2
shows that preferred Personalization is a causal factor of actual
Dissatisfaction and Satisfaction ($p<0.01$). Similarly it is shown that
Personalization is a causal factor of Innovation and Individualization in
actual classes ($p<0.01$) (see Fig.3 and 5). As Personalization consisted
of the items like "The instructor helps each student who is having
trouble with the work" and "The instructor talks individually with stude
nts", these results means that the extent of students' expectations for
personal relationship to a instructor or his/her help has effect on
students assessment of actual classes. It may be interpreted as student
s' independent attitudes toward learning are good advantage for them in
an actual classroom.

4. DISCUSSION

Ishikawa & Hirata (2003) have reported that the structural equation
modeling indicated that Personalization and Innovation are causal factors
of Satisfaction in an actual classroom. Personalization means interaction
between teacher and students at class, and Innovation means the use of
new technology in classrooms. It followed that students' perceptions of
teacher involvement with students and the new use of educational

methods in class apparently are linked to greater students' satisfaction. As mentioned above, Hirata (2003) also found that the high-achieving students felt more satisfaction toward their classes than the low-achievers, and that students with a more internal locus of control reported greater satisfaction in the classroom.

　The purpose of this study was to discuss a plan of curriculum design and improvement that considers students' individual needs, from the findings of the causal relation models between actual and preferred classroom environment as perceived by students at the college and university level.　The results showed that first, the preferred form of each five scales; Dissatisfaction, Satisfaction, Innovation, Personalization, and Individualization was a causal factor of the corresponding actual form of that scale.　This means that high strong needs and expectations for learning are indispensable to creating successful actual classroom environments.　Secondly, it was shown that students' preferred Personalization have an distinctive effect on all the other factors in actual classroom environment.　As we saw that Personalization was an essential factor which related to students' satisfaction at classes, one may say that it is advisable for instructors to be more considerable toward students' personal needs even in a large size classroom. Simultaneously, one may say less satisfaction will be brought to students when they would expect too much personal involvement or help from others.　These findings suggests that it would be good advantage for students to have an independent attitudes toward learning in an actual classroom.　The views here support the results in our previous study of the students' locus of control, as higher internal locus of control tendency means one's greater self-confidence for what to do at class. However we should bear in mind that it was reported that Japanese

students in higher education regarded teacher's good personality with gentle manners as the most important essence for a good class (Kataoka & Kitamura, 1989). We may here develop our discussion into the subconscious expectation (expectation without a verbal request, modesty, or passiveness) of Japanese, formally known as "amae/ dependent" (Doi, 1971). In the light of both the high ratio of students who go on to higher education and cultural background, it seems reasonable to suppose that students' strong expectations for a teacher at class would be the own peculiar character of Japanese college and university. Thus, as concerns students' needs of teacher involvement, further research would be needed before the conclusion, especially in context of cultural differences. The cross cultural use of the same measure in different countries would be useful, it would help account for the characteristics of each backgrounds in education.

Finally, the results of this study lead to the conclusion that it is quite beneficial to measure the students' individual needs within their class, not only for designing and improving a curriculum suitably, but also for interpreting the results of the class evaluations accurately. This study may be significant because of the causal relationships were brought to light between students' preferred educational environment and actual classroom environment. Using these psycho social measures, teachers can easily obtain valuable information about what is happening in their classroom. If instructors in colleges and universities could get cues about their students' dissatisfaction with their class, they could attempt to improve particular causal factors of satisfaction reciprocally.

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NOTE

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