Analysis of Influential Factors on Computer Literacy Course Evaluation

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Abstract: The purpose of this paper is to examine the factors that influence the students' satisfaction of college's computer literacy courses. Covariance structure analysis was used to analyze the course evaluate data by students. Following six points should be concluded from the results of the analysis: (1) improving course understanding will enhance students' satisfaction. (2) "Instructional Efforts" improve "Satisfaction" indirectly through "Factors of Students" and "Understanding". (3) "Communion" improves "Satisfaction" indirectly through "Degree of Understanding" (4) students with no absences are influenced more by faculties than ones with absences to increase their satisfaction. (5) Total effects of "Instructional Efforts" in the "No absences group" is much stronger than those in "with absences" (6) Effect of "Communication" through "Degree of Understanding" is the strongest of all effects in both groups.

Introduction

The concern with Information Education has been growing for the last several years in Japan. To become a teacher it is necessary to acquire a teaching certificate. MEXT (Ministry of Education, Culture, Sports, Science and Technology) has revised the "Teaching Certificate Law" to adjust to the development of information technology in society in 1988. As a result of this revision, a new subject "Teaching Methods and Skills (including the use of information technology)"was required for students who want to acquire teaching certificates. In other words, improving "Computer Literacy" became necessary not only for college students but institutions. According to statistics of MEXT in 2003, the ratio of the teachers that are able to teach students with computers increased to be 72.7% in Elementary schools, 53.8% in Lower and 46.1% in Upper Secondary Schools (MEXT, 2004).

The curriculum of Information Education in Secondary Schools has improved in recent years. The unit "Information and Computer" (included in the subject "Technology and Homemaking") became required in Lower Secondary Schools in 2002. Next year a new required subject "Information Technology" was established in Upper Secondary Schools. Furthermore, MEXT directed all Elementary and Secondary schools to use computers effectively in the "Period for Integrated Study" and other subjects. The "Period for Integrated Study" was established in 1999 when National Curriculum Standards were revised for the last time. It aims at helping children develop capability and ability to discover problems by themselves and solve those problems properly (The Curriculum Council, 1998).

In order to improve computer literacy of teachers in the future, institutions with teacher training courses have obligations to make their computer classes effective enough. It is reasonable that they use students' course evaluation ratings to improve their courses because course evaluation by students has become popular among colleges and universities in Japan recently. Eble (1984) states "tangible measures if judgment (student ratings) gets preference, not because they may be better, but because they afford written evidence that may stand up in court" However, most of

the institutions or faculties are not able to use the results to improve their courses efficiently. Braskamp and Ory (1994) suggest that most faculty view student ratings as one important indicator of teaching ability. Not only teaching abilities but students' satisfaction with courses must be enhanced based on their course evaluation data. Thomas and Galambos (2004) investigated how students' characteristics and experiences affect satisfaction using regression and decision tree analysis with the CHAID algorithm. They conclude that faculty preparedness is a principal determinant of satisfaction. Asaba, Inaura and Sato (2004) found that the Degree of Understanding affected the "Degree of Satisfaction". They also suggested that students' physical condition and motivation do not influence as much as the "Degree of Understanding." The purpose of this paper is to examine the factors that influence the satisfaction of college's computer literacy courses based on students ratings.

The Study

Data for this analysis were drawn from student ratings of four computer literacy courses having the same curriculum in 2003. These courses are designed for first grade students, of whom almost one third hope to acquire teaching certificates. The sample of the survey was 171 except for the data including missing values. Covariance structure analysis was used to analyze the data of students' course evaluations. To make the covariance structure models, we made the following five potential variables that were based on factor analysis. These potential variables are constructed of several observed variables. All observed variables of the questionnaires were rated on a 5-point scale from 1 ("strongly disagree" or "poor") to 5 ("strongly agree" or "excellent"). **Figure 1** shows relations considered in the course evaluation. It is difficult to change input variables for faculties, so we used only process and output variables to construct the model.

Variables of faculties;

(1) "Instructional Efforts" from the following three observed variables
   a. Voice could be clearly heard
   b. Prepared for the class enough
   c. Demonstrates enthusiasm for the class
(2) "Communication" from the following two observed variables
   a. Check students' comments or reactions for the class
   b. Consider students' Degree of Understanding

Variables of students;

(3) "Factors of Students" from the following two observed variables
   a. Degree of students' effort for the class
   b. Degree of students' expectation of the class

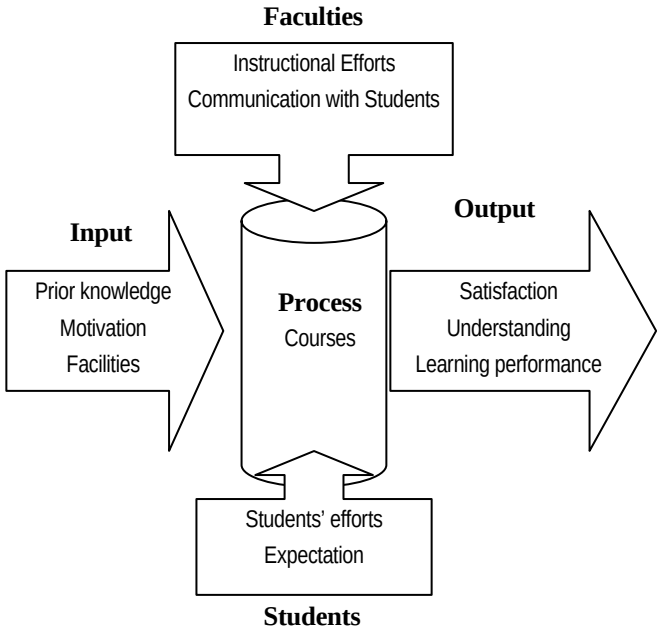


Figure 1: Variables for course

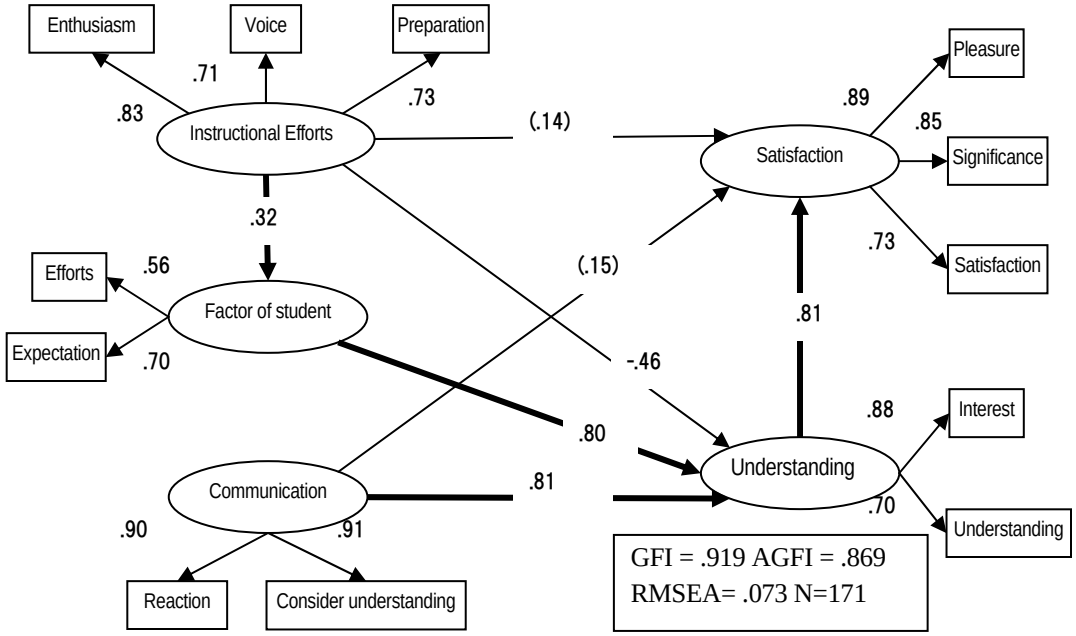
Variables of output

(4) "Degree of Understanding" from the following two observed variables
   a. Degree of Understanding of the class
   b. Increase of interest in the subject

(5) "Degree of Satisfaction" from the following three observed variables
   a. Significant for students
   b. Took pleasure in attending the class
   c. Degree of Satisfaction of the class

Findings

With the above observed and potential variables, a covariance structure model named "Interactive Model Ⅰ" was structured. ML (Maximum Likelihood) Method was used to estimate regression weight. The path diagram is presented in **Figure 2**. In the diagram oval shows potential variable and rectangle shows observed variable. At first there were paths both from "Factors or students" to "Degree of Satisfaction" and from "Communication" to "Factors or students". However, modifying the model to improve the fit index, these paths were eliminated. GFI (goodness of fit index), AGFI (adjusted goodness of fit index) and RMSEA (root mean square error of approximation) were used to evaluate fitness of the model. A value of the RMSEA of about .05 or less would indicate a close fit of the model in relation to the degrees of freedom. It is also indicated that a value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation and would not want to employ a model with a RMSEA greater than 0.1 (Browne and Cudeck, 1993). According to these standards, it is possible to be able to employ Model 1(GFI=.919 RMSEA=.073). While the direct effects of "Instructional Efforts" and "Communication" on "Satisfaction" are not significant, indirect effects through "Factors of Students" or /and "Understanding" are significant. "Instructional Efforts" could improve "Satisfaction" through "Factors of Students" and "Understanding". The estimate value is calculated to be .21(.32 × .80 × .81) that is greater than direct one (.14).On the other hand, "Communication" influences "Satisfaction" only through "Understanding". The estimate value is calculated to be .66(.81 × .81) that is much greater than direct one (.15).

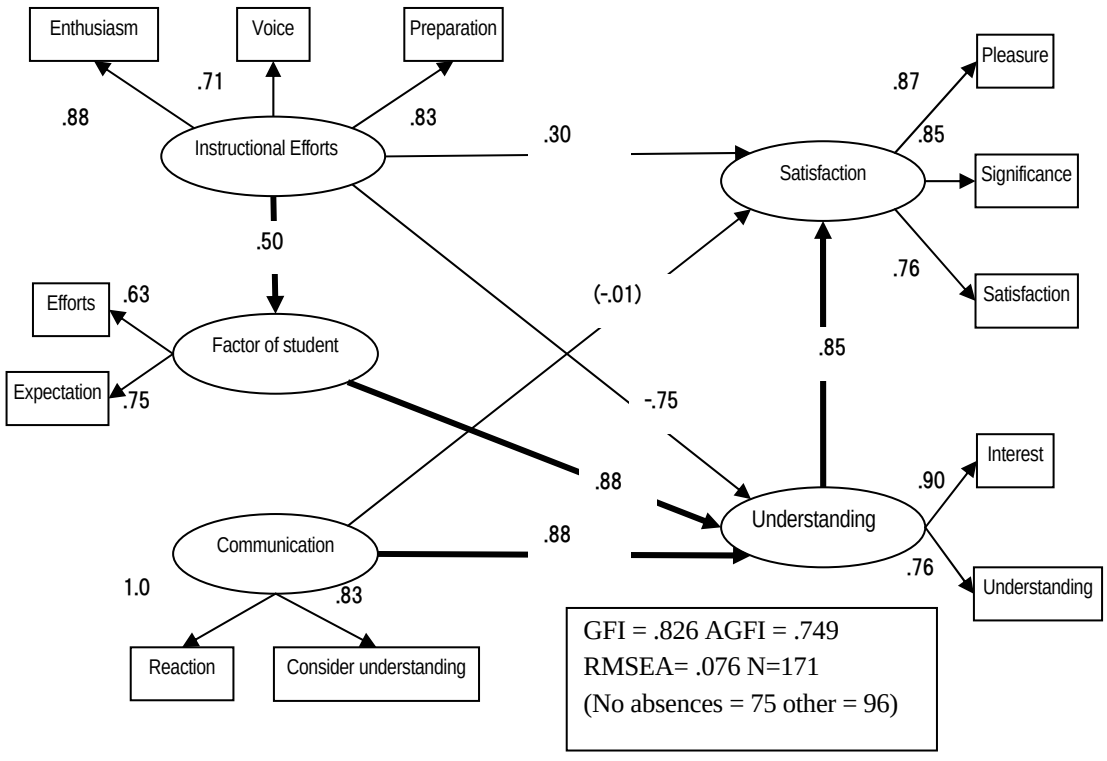


Note: All parameters are significant except ones with ( )

Figure 2 Interactive Model 1 (Standard regression weight)

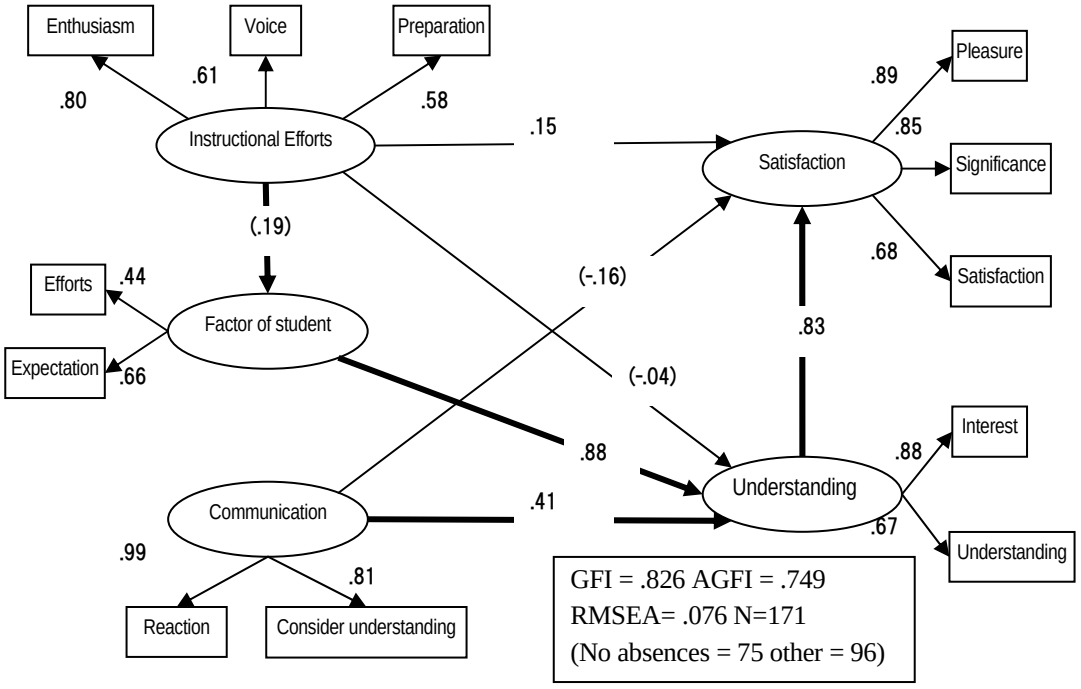
To examine the effects of faculties' variables more clearly, we used "Multiple-group analysis" that make it possible to know whether the different groups have the same value of regression weights, or if only certain regression weights are the same for the groups (Kline, 1998). A sample was divided into two groups. One was composed of students that were not absent from any classes (N=75), another was composed of those who were absent from one or more classes (N=96). The result of the Multiple-group analysis was that the value of the GFI=. 826 and the one of the RMSEA=.076. Although a value of GFI was less than .90, it seemed reasonable that we employed this model because of a value of the RMSEA that was less than 0.1.**Figure 3** and **Figure 4** show the results of the analysis of two divided groups.

In "No absences group" the effects of "Instructional Efforts" on "Factors of Students" and "Degree of Satisfaction" are stronger than ones in "With absences group" (parameter values are .50 and .30). As for the effect of "Instructional Efforts" on "Factors of Students", parameter value of "No absences group" is significant, on the contrary, one of "With absences group" is insignificant. The effect of "Communication" on "Degree of Understanding" is stronger in "No absences group" as well. Parameter value of "No absences group" is .88, while one of "With absences group is .41. On the other hand the effects of "Degree of Understanding" on "Degree of Satisfaction" of both groups are almost same (parameter values are .85 and .83). It follows from these results that in "No absences group" factors of faculties effect more strongly on "Degree of Understanding" and/or "Degree of Satisfaction" than in "With absences group".



Note: All parameters are significant except ones with ( )

Figure 3 Multiple-group analysis model 1 (No absences group) (Standard regression weight)



Note: All parameters are significant except ones with ( )

Figure 4 Multiple-group analysis model 2 (With absences group) (Standard regression weight)

It is not sufficient to use standardized regression weight only in multiple-group analysis. Discussing non-standardized one is appropriate to compare two groups. We calculated both direct and indirect effects on non-standardized regression weights to examine the total effects that appear in Table 1. Some parameter values were negative because of a strong correlation among concerning variables. It seems reasonable that these parameters mean no effect, so we indicated them as "0" in the table.

Table 1 Total Effects on "Degree of Satisfaction"

group	Unobserved Variables	Direct Effects	Indirect Effects		Total Effect
			through **Degree of understanding**	through **Factors of students & Degree of understanding**	
No absense N=75	Instructional efforts	0.218	0.000	0.278	0.496
	Communication	0.000	0.550	0.000	0.550
With absence N=96	Instructional efforts	0.111	0.000	0.107	0.218
	Communication	0.118	0.259	0.000	0.377

As the table indicates, the total effects value of “Instructional Efforts” in “No absences group” is .496 that is about 2.3 times as much as one in “With absences group”. The effect of “Communication” is stronger than one of “Instructional Efforts” in both groups, however, there is no direct effect in “No absences group”.

Conclusion

We examined how the factors of faculties influence the satisfaction of classes using covariance structure analysis. In the first place, we structured “Interactive Model 1” that suggests the following three points: (1) improving course understanding enhances Students’ satisfaction. (2) “Instructional Efforts” improve “Satisfaction” indirectly through “Factors of Students” and “Understanding”. (3) “Communion” improves “Satisfaction” indirectly through “Degree of Understanding”. In the second place, “Multiple-group analysis” was employed to examine the difference between students with “No absences” and “With absences”. The results of this analysis show the following three points: (1) Students with no absences are influenced by faculties and increase their satisfaction more than those with absences. (2) Total effects of “Instructional Efforts” in “No absences group” is much stronger than ones in “with absences” (3) Effect of “Communication” through “Degree of Understanding” is the strongest of all effects in both groups.

It should be concluded, from what has been said above, that faculties should increase not only their “Instructional Efforts” but “Communication with Students” to enhance their satisfaction of classes. The future direction of this study will proceed in two ways; one will be to refine variables to restructure models, another will be a study through qualitative method.

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