Analysis for the Causal Relationship of Education Quality Factors in Korea

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Abstract

The purpose of this study is to analyze the causal relationship, in the perspective of Total Quality Management, among the education quality factors, which were suggested in the previous researches. Lee et al. [16] had tried to analyze the relationship among education factors, but they did not estimate the education factor using latent variable concept, which is very reasonable and efficient to represent the constructed concepts. So this study attempts to analyze the causal relationship among education quality factors, represented as latent variables used in structural equation modeling (SEM), and compared with each other.

In this study, education quality factors were measured by several measures, constructed as several latent variables, and then processed with AMOS, the most efficient statistical package in the SEM area. In order to analyze the causal relationship among the education quality factors constructed as latent variables, this study designed the structural equation model with suggested factors and established several research hypotheses.

This study discovered a prominent causality among the education quality factors, such as education leadership, student scholastic performance and satisfaction of education quality, which is similar to that of previous research. This outcome is really a unique Korean syndrome manifest within our educational career orientation.

Key Words: Education Quality, Causal Relationship, AMOS, SEM, Path Analysis, Latent Variable

1. Introduction

Education has become the most strategic factor, by which one nation's competitiveness is determined. All the country including U.S., Japan and Korea place top priority on improving the education excellence. However, it is very difficult problem to assess and to control the educational outcome for the performance of education activity requires a long time in order

to be implemented.

Recently educational performance of Korean education system has become a controversial hot issue. This, in general, corresponds with degrading academic and practical abilities in Korean college graduates, who had entered colleges after finishing the Scholastic Aptitude Test (SAT) in high school with the newly introduced educational curricula. It also triggers a very controversial debate about the quality of education service. This resulted from difference in the interpretation of educational outcomes, which are very hard to measure and estimate because they lack specific and clear quantifiable standards of education quality [16]. Meanwhile the U.S., which maintains dominant educational excellence worldwide, established the education quality award in 2000, and announced the quality evaluation standards to establish a guideline for the operation of academic institutions. This is contrasted with that of Korea in many respects. In Korea, domestically, many researches had been performed, mainly in academic institutions like universities, but which were approached partially from the beginning stage of education quality although not from the eventual TQM (Total Quality Management). For example, J. Lee [14] did not use the education quality concept to improve education practice but adapted it as a mean to improve macro performance of quality improvement. Further there were also several other types of research, such as one focused on the education culture [22], and another surveying the response of teachers about education quality [4]. All this research introduced the Deming's TQM Principles to satisfy the needs of education interests and tried to interpret education quality, because much effort to improve qualities, using principles applied in the business and industry, had achieved outstanding performance in many aspects.

Even though some serial researchers attempted to combine service quality management into education quality movement, in a perspective of regarding education as service, it is a very difficult problem to measure education service quality and to manage the performance of quality control activities. Wunder initially attempted to analyze degree of education quality satisfaction and then to develop SQSS (School Quality Satisfaction Survey) [24]. Lee et al. performed a study to combine SQSS with the Deming's quality factors [15], but lacked investigation into their relationship with the quality performance. Thus their study is insufficient for not characterizing factors of quality satisfaction and analyzing their relationship focused only upon the survey of quality satisfaction. Lee et al. [16] had tried to analyze the causal relationship using path analysis, but they measured the education factors using the traditional means. So their conclusion might have some distortion owing to smoothing effect of simple means.

Therefore this study sets its purpose as analyzing education factors with using the struc-

tural equation modeling (SEM) approach and with introducing the latent variable concepts. In other words, this study analyzes that relationship with using SEM to compare with the result of Lee et al. [16]. So, this study uses the same research model but tries to analyze the object factors in the different way. However this study also extracts the education quality by integrating existing research, to formulate a research model, then to perform a causality analysis to investigate the influence relationship among quality factors.

In order to perform an empirical test, this study used a questionnaire designed with extracted factors from the existing literature and then analyzed the data with path analysis of AMOS (Analysis of Moment Structure), which gets a good reputation as a useful system to process the SEM data.

2. Theoretical Background

2.1 TQM Approach to Education

2.1.1 Quality of Education Service

If we can regard education as service, it is totally valid to explain the education quality as the service quality, and is indeed logical to approach education quality with the TQM of service quality [16].

It is an important matter to measure quality in service management, so Zeithmal et al. [25] defined service quality as being the difference between the customers' expectation or demand level and their perception, so he developed a scale, SERVQUAL, which is in the same context in assessing attitude as the difference between perception and expectation in organizational behavior. Therefore, we can measure education quality as the difference between the expectation and the perception of education.

2.1.2 Education TQM

As Lord pointed out regarding enterprises, which brought their quality management focus onto the global markets in order to survive in a whirlpool of infinite competition of open economy in WTO period, perceived the only competitive strategy to manufacture the low price and high quality products [17], i.e., the quality improvement is a unique competitive strategy in all aspects. Kim said that an understanding of customers' needs is the starting point for quality improvement in service and products for the purpose of quality improvement is satisfying customers' needs [13]. Deming developed and presented 14 points of management, i.e. a framework of philosophy, by which enterprises could become absorbed in

quality improvement continuously [7], which were recently used as important checkpoints of TQM.

In general, if TQM is regarded as a systematic approach to the service quality improvement toward customers, education customers are those including students, parents, community members, senior academic institutions, employers who employ graduates, and the continuous improvement is a process of increasing the improvement efforts involved by employers and employees [18], thus the goal of education quality is meeting the expectation of education customers. As TQM is process oriented, Miller (1996) said that we could continuously improve the process by understanding the system operating in the organization [19]. Also Garvin (1991) said that gaps between suppliers and customers, and between organization insiders and outsiders, can be narrowed by thinking systematically [8]. Arcaro (1995) pointed out that change of TQS (Total Quality School) began by sharing commitment to the education quality, and might have the same contextual opinion of a systematic approach to a quality system. In the same context, many studies in education administration advocate that TQM as an appropriate tool to improve schools and regional societies [5, 10].

In summary, if TQM is applied in education systems, education quality will be improved by improving continuously its service process to customers of education.

2.2 Education Quality Approach in Existing Researches

2.2.1 Educational Significance of Malcolm Baldridge NQA

The Malcolm Baldridge National Quality Award (MBNQA) has global authority, for it is a symbol of nationwide efforts for the U.S. economic recovery, and because its evaluation standards are designed very reasonably and rationally. U.S. institution of this award has several goals: first, to inspire competitive ability and quality consciousness; secondly, to build-up a nationwide consensus about corporate excellence, and to diffuse information about the advantages of quality strategy implementation. MBNQA had collected public opinions of experts and institutions including ASQ (American Society for Quality), ANSI (American National Standard Institute), universities and consultants, and designed the evaluation standards and methods by IQS (International Quality Study), and has been verifying and revising continuously all the terms through up to almost 900 case studies. Therefore, its authority is being increased incrementally.

October 30th, 1998, President Clinton signed a legislative bill adding the education, health and medical section to the MBNQA Program, made an evaluation standard draft and distributed it to many of the concerned institutions nationwide in order to collect their opinions.

In 1999, he completed it and, at the end of January 2000, pronounced, after revision and complementation, 'Evaluation Standards 2000'. Arcaro (1995) analyzed advantages of its application and suggest a TQM model having 5 key factors which included customer orientation, total commitment, measurement, contribution and continuous improvement in building an academic organization focused on the belief and value of the school [2].

2.2.2 Application of Deming's Theory to Education Quality

Deming's 14 paradigms had changed into being environment friendly, and had been presented to educators to be introduced as an improvement in the educational process as several types in the education field like that, in which Bonstingl (1992) changed the paradigms to the most educational ones with an educational approach [9].

2.3 Factors of Education TQM in existing literatures.

Jacobson (1996) expressed that parents expected schools to provide students with an excellent education in order to acquire the abilities necessary to lead a successful and productive life, and that parents wanted to commit themselves more through meaningful communication, shared decision, and cooperative efforts for advancing studies [11]. Richard W. Riley, U.S. ex-secretary of education, said that commitment of parents and community is a necessary factor for development of schools, in a speech of the National Parent Teacher Association's Standards to improve schools, and that type of commitment would be communication, parenting, student learning, volunteering, school decision making and advocacy, and collaborating with the community.

Murgatroyd-Morgan (1993) suggested the school-leadership model, in which he insisted the demands of education beneficiaries should be satisfied in order to apply the TQM concept to school administration, for which school administrators should provide quality leadership into full play to increase the task accomplishment through motivating their members [20]. Also they insisted that the quality culture, based on a good quality school culture, had to be established for the success of TQM in school organization, to which the open communication had to be linked together with school members' commitment to accomplish the education goal. Therefore the trinity of culture, commitment and communication would be harmonized appropriately. In addition, they told that leadership, a key factor of TQM in school administration, had to be backed up with a specific strategy based on vision for education, and with team organization and tools to accomplish goals. Wooten (1994) had determined the behavior factors which had influenced on successful implementation of TQM, and proved it by

empirical study [22]. That is, he explained the process, in which leaders used members' participation, authority delegation and reward system to motivate members to induce their commitment to accomplish their task performance, when managers implemented the organization change with strong leadership.

In summary, key factors of education TQM, shown in the existing literature, are parents and community participation, education leadership and traditional TQM factors.

3. Designing Research Model for Education Quality Factors

3.1 Education Quality Factors in Existing Literature

Key factors of education TQM include school, community, parents, TQM factors, education process and performance. In the same context, Lee et al. (2000) classified all the factors abovementioned into service quality, TQM, effective school, expectation of parents, and then developed a questionnaire, using the SERVQUAL scale, to measure the education quality. This study is in the same context with Wunder's (1997), in which he suggested 5 determinant dimensions of physical environment, interest toward education service demand, principal leadership and administration, community participation and outcome of students' learning. However, we can point out that Lee et al. (2000) had focused on measuring the satisfaction degree of the education quality, but that they did not relate satisfaction with other key education quality factors. Also, Wunder (1997) did not relate the factors with each other, for he had focused on the measurement of education quality as well. Therefore, this study complements their lack to integrate their results and to analyze the relationship among factors, especially in the manner of causality analysis.

3.2 Designing Research Model

Lee et al. [16] had designed a research model considering the Korean circumstance in order to acquire the relevance of the education field. In Korea, the most important factor of education quality service is scholastic achievements of students, especially the ratio of famous college admission.

In this context, this study hypothesized that the scholastic achievement factor has an influence on education quality, so has introduced it as an intermediate variable. As shown in the figure-1, this study adapts education leadership, process improvement, education environment and community participation, as independence variables, scholastic achievement as an inter-

mediate variable, and education quality as a dependent variable. This model means that the independent variables influenced the dependent variable through the intervention of an intermediate variable.

In this research model, education leadership corresponds to the principal leadership of Wunder's (1977), and the process improvement to the interests toward education service demand. This study noticed that process improvement means the education reform process implemented continuously in Korea, like a disaster. Also the education environment corresponds to the physical environment of Wunder's, and community participation to parents and community participation. Scholastic achievement, intermediate variable, comprehends the contents relating to students' learning. Education quality, dependent variable, is defined as the satisfaction level of respondents, in some part arbitrarily.
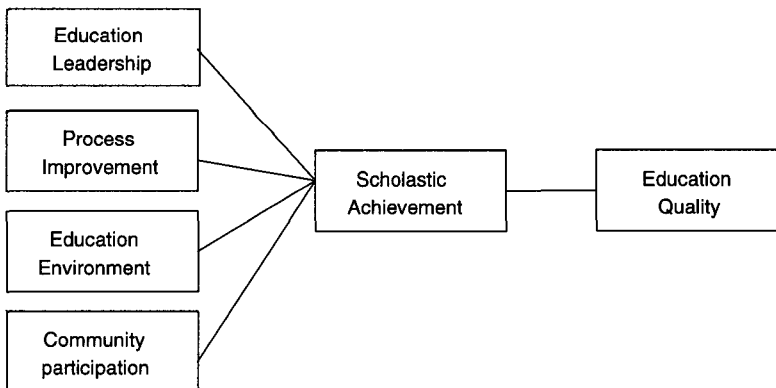

Figure 1. Research model

3.3 Designing Questionnaire

This study designs a questionnaire according to the research model, shown in figure-1 suggested by Lee et al. [16]. Factors in Figure 1 correspond with latent variables of Covariance Structural Modeling, like AMOS (Analysis of Moment Structure), and LISREL (Linear Structural Relationship). This study defines them in the measurement model. Items in the shape of square are used as measures of factors in the shape of circle.

The measurement variables of all factors are shown like as the Figure 2, which are converted into questions on the questionnaire using Likert's 5 points scales. Then all the measurement variables would be converted into several latent variables represented as a circle in Figure 2.
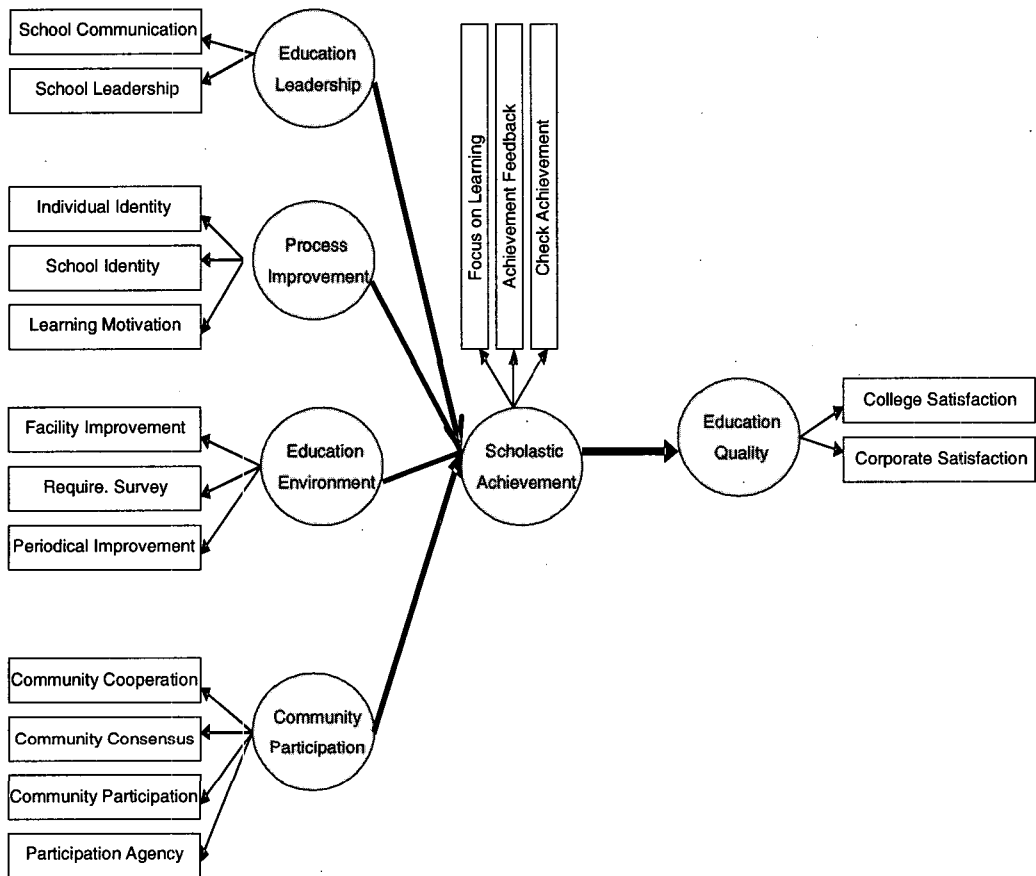
Figure 2. Specific structural model of this study

This study defined the causal variables as follows: Education leadership is measured as the total communication inside and outside of school and the existence of whether strong leadership of principal is or not. Process improvement is measured with curricula in order to emphasize student's personal identity, with school circumstance to emphasize the school identity and with the existence of education process to motivate the learning ambition of students. Education environment is measured with the facility improvement, the survey for facility improvement demand, and with periodical facility improvement. Community participation is also measured with the cooperation of community, the consensus between community and school, the participation of community, and with the institutional mechanism for community participation. Scholastic performance, the intermediate variable, is measured with the degree of emphasizing learning, and with the testing of scholastic performance and its

periodical feedback. Education quality, the resultant variable, is measured with the expected satisfaction degree of eventual education demanders, universities and firms, by responders.

3.4 Designing the Research Hypothesis.

For the research methodology, Lee et al. [16] used the path analysis developed by S. Wright is used to investigate the causality relationship among factors [12]. Path analysis can make it easier to grasp the direct and indirect effects. This study adapts the structural equation modeling to analyze the causality contained in the factors. The difference between the traditional path analysis and our approach is how the latent variables are estimated. Then our approach also uses the concept of path analysis.

This study attempted to test, is that education leadership, process improvement, education environment affect to education quality, through the instrumentality of scholastic performance. Research hypotheses of this study are designed in the two stages.

Research Hypothesis: Causal factors of education quality effect education quality through the instrumentality of scholastic performance.
Sub-hypothesis 1: Education leadership effects scholastic performance.
Sub-hypothesis 2: Process improvement effects scholastic performance.
Sub-hypothesis 3: Education environment effects scholastic performance.
Sub-hypothesis 4: Community participation effects scholastic performance.
Sub-hypothesis 5: Scholastic performance effects education quality.

4. Empirical Survey and Analysis

4.1 Survey

This study made a survey on high school teachers, education administrators and parents, in the Yeongnam region from September to October 2003, and gathered 318 responds from 350 distributions, in which 299 responds were acceptable and 19 insincere. The survey was performed in the way that researcher had visited the object schools and explained how to respond, and that questionnaires for parents were distributed to the parents indirectly through teachers to reply precisely within the guidelines of the questionnaire. Demographical characteristics of the respondents are like as Table 1, i.e., 77 teachers, 213 parents, 7 education administrators.

Table 1. Demographical Characteristics of respondents

Characteristics	Classification	Frequency	Composition ratio(%)
respondent	teacher	77	25.7
	parent	213	71.3
	administrator	9	3.0
hierarchy of teacher	vice principal	1	1.3
	chief teacher	5	6.6
	teacher	70	92.1
hierarchy of administrator	director	2	22.2
	personnel	5	55.6
	assistant	2	22.2

4.2 Analysis

Data originated from the gathered respondents were input as a data file and processed with AMOS 4.0.1., for analysis of outcome after the basic preprocess of SPSS.

4.2.1 Pre-Analysis

In order to evaluate reliability and validity of 18 items for measuring the service quality of school education, reliability module of SPSS was used to estimate the degree of internal consistency. In case of reliability, even though the critical value was not specified to guarantee the internal consistency, the level of Cronbach's alpha, 0.5~0.6 that Nunnally (1967) had recommended, can assure the reliability of scales [21]. Factors of this study could be guaranteed to the internal consistency for the values of Cronbach's alpha range from 0.6571 to 0.8484 as shown in Table 2.

Table 2. Internal Consistency of Quality Factors

Variables	The number of items	Cronbach's Alpha
Education Leadership	2	0.6571
Process Improvement	3	0.7472
Scholastic Achievement	3	0.7272
Education Environment	3	0.8214
Community Participation	4	0.8484
Education Quality	2	0.7521

For verifying the validity of data, the result of factor analysis for items of the questionnaire is presented in the Table 3, by which several latent variables are identified like as

6 factors. Generally speaking, factor analysis is used for the dimension examination of variables, the conversion to factor score for additional analysis like as regression analysis and discriminant analysis, the extraction of validity obstructing variables [9] but, in this study, is used for the pre-analysis of AMOS. Factors are extracted by the covariance analysis with VariMax rotation and by principal analysis based on Eigen value, 1.0. As shown in table-3, each measurement variable was loaded well separately but community participation and education process are loaded in the same factor. This result can induce correlations between latent variables, yet be used without extra modification.

Table 3. Result of Factor Analysis

Factor	Factor1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Labels	Process Improvmnt	Education Environ.	Schola. Achieve.	Leadeshp	Education Quality	Comm. Participa.
RB2	.822	.157	.040	.063	.087	.047
RB1	.821	.137	.061	-.034	.049	-.062
RB3	.809	.136	.043	.171	-.003	.095
RD3	.648	.153	.130	.205	.086	.189
RD2	.561	.253	.094	.161	.158	.300
RD1	.531	.149	.024	.221	.146	.335
RC2	.123	.861	.056	.133	.120	-.090
RC3	.193	.651	.044	.129	.131	.244
RC1	.367	.645	.049	.115	-.035	.171
RE3	.295	.096	.827	-.171	.042	.173
RE2	.097	.041	.762	.316	-.005	-.090
RE1	-.238	.024	.586	.320	.406	.011
RA2	.103	.237	.151	.694	.023	.069
RA1	.253	.105	.142	.437	-.063	.184
RF1	.164	.189	.175	-.097	.887	.055
RF2	.308	.018	-.140	.497	.522	.085
RD4	.187	.143	.027	.152	.051	.922
eigen value	3.593	1.886	1.743	1.382	1.329	1.287
Cum. % of Variance(%)	21.14	32.23	42.48	50.62	58.44	66.04

Legends: RA1: School Communication   RA2: Principal Leadership
RB1: Individual Identity   RB2: School Identity
RB3: Learning Motivation   RD1: Community Cooperation
RD2: Community Consensus   RD3: Community Participation
RD4: Participation Agency   RC1: Facility Improvement
RC2: Facility. Improvement Inquiry   RC3: Periodical Facility Improvement
RE1: Focus on Learning   RE2: Check of Achievement
RE3: Achievement Feedback   RF1: College Quality Satisfaction
RF2: Corporate Quality Satisfaction

4.2.2 AMOS Analysis

AMOS, developed by J. L. Arbuckle is a type of SEM (Structural Equation Modeling) integrated with factor analysis and regression analysis, and can process statistical data efficiently in the way of visual graphic method [1]. SEM can analyze the theological causality between construct concepts and the empirical causality by measurement indices of correlation [12]. Also, AMOS is very easy and efficient to use in the platform of SPSS and for being able to deal the SPSS input raw data without additional processing. Also AMOS can obtain same result with that of SPSS. Even though this study uses the terminologies of already well-known LISREL without specific definition or explanation, there are no difficulties in developing logics for path analysis is based on multiple regressions.
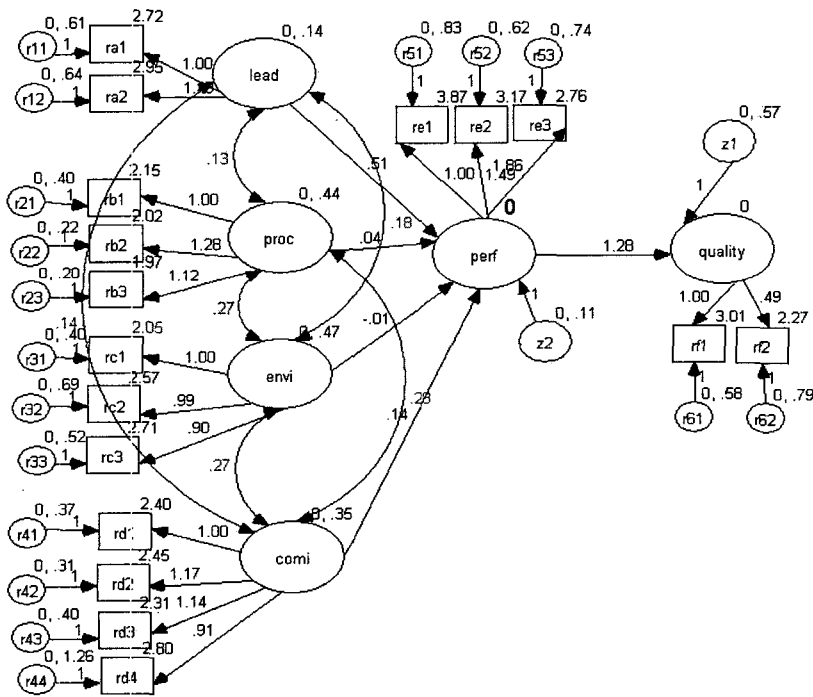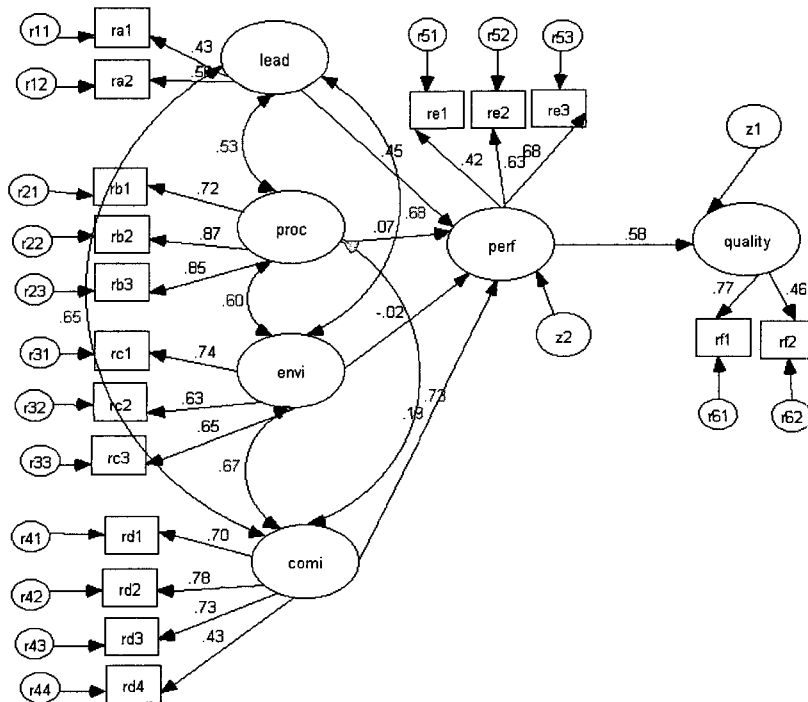

Legends: lead: Education Leadership,   proc: Process Improvement,
          envi: Education Environment   comi: Community Participation,
          perf: Scholastic Achievement,   quality: Education Quality Satisfaction
          Details of measurement variables could be referred to Figure 2 and Table 2.

Figure 3. The unstandardized results of AMOS analysis

Figure 3 and Figure 4 show the graphic results of AMOS analysis. Figure 3 represents

the results with the unstandardized estimates, by which we can identify the estimated values of the measurement values and those of latent variables, and, in the meanwhile, Figure 4 shows the results with the standardized estimates. As shown in the Figure 3, the correlation among the casual variables is revealed, which is expected before in the results of factor analysis. The most important meaning of this model in Figure 3 is all the latent variables are measured with factor loading coefficient different from the traditional means used in Lee et al. [16]. All the standardized coefficients of Figure 4 represent the coefficients of regression analysis, which explaining the relationship between the latent variables.

From now on, the hypotheses, which have intended to analyze the influences of causal variables of educational quality to education quality, suggested in the previous chapter, are tested with using the results of Figure 3 and Figure 4. The detailed explanations about all the coefficients will be shown in the rest part of this paper.

Legends: lead: Education Leadership,   proc: Process Improvement,
         envi: Education Environment   comi: Community Participation,
         perf: Scholastic Achievement,   quality: Education Quality Satisfaction
         Details of measurement variables could be referred to Figure 2 and Table 2.

Figure 4. The standardized results of AMOS analysis

4.3 Test of fitness

Fitness of the model is its degree of consistency between the research model and the practical data model using covariance data. In other words, fitness can be defined basically as consistency of characteristics of sample data (S) and theoretical characteristics (Σ) and can be verified with χ^2-test as well. However, the statistics of χ^2-test is too sensitive to the degree of freedom to reflect the fitness of models, and thus is usually not used in practice.

In Table 4, there are several terminologies of AMOS such as saturated model, independence model and default model. The default model is the object model analyzed. Generally speaking, in AMOS, over-identified model is a characteristic model and saturated model that corresponds to a perfect theoretical characteristic one, and the independence model is the worst fitted model of the smallest estimates. A necessary condition to identify models is that the number of information provided (the number of coefficients of data model) is same or more than that of estimates, to which AMOS calls over-identified model and saturated model.

Table 4. Indices of Model Fitness

Model	DELTA1	RHO1	DELTA2	RHO2	
	NFI	RFI	IFI	TLI	CFI
Default model	0.984	0.977	0.990	0.986	0.990
Saturated model	1.000		1.000		1.000
Independence model	0.000	0.000	0.000	0.000	0.000

In this study, the statistics of χ^2-test is 275.243 (where the degree of freedom is 108), of which the probabilistic level of significance is 0.0. Therefore, this means the existence of significant difference between two models but we don't consider it with above-mentioned reason. Instead, let's see the value of the commonly used NFI (Normed Fit Index), 0.984. This means that the level of fitness is 98.4% compared with the saturated model. Also RFI (Relative Fit Index) proves the complete fitness when the value approaches to 1. The value of RFI of this study, 0.977 means the fitness of research model positively. From all things above-mentioned, the results of all the statistics verify the fitness of our research model.

4.4 Significance of AMOS estimates

In LISREL, like as the traditional statistical testing procedure, t-test is used to evaluate the significance of estimates of variables adapted in the research model, and in the same

context, AMOS uses t-test too. In the Table 5 below only the values of CRs (Critical Ratio) are presented to evaluate the significance of estimates.

Table 5. Significance test for estimates of coefficients

Regression Weights:	Estimate	S.E.	C.R.
ra1 <----------- lead	1.344		
rb1 <----------- proc	1.000		
rb2 <----------- proc	0.871	0.112	12.262
rb3 <----------- proc	1.244	0.104	12.006
rc1 <----------- envi	1.003		
rc2 <----------- envi	1.121	0.133	8.243
rd1 <----------- comi	1.137		
rd2 <----------- comi	0.396	0.083	13.172
rf1 <----------- quality	1.000		
rf2 <----------- quality	1.092	0.164	2.414
rc3 <----------- envi	1.000	0.130	8.754
ra2 <----------- lead	1.093	0.209	5.364
rd3 <----------- comi	1.000	0.087	11.589
rd4 <----------- comi	1.243	0.293	4.243
re3 <----------- perf	1.371	0.132	6.613
re1 <----------- perf	1.000		
re2 <----------- perf	1.000	0.174	7.715

In Table 6, we can evaluate the significance of coefficients of latent variables. Like as previous procedure, three estimates in the top row have no significance except the estimate from education leadership (lead) to scholastic performance (perf) and the one from scholastic performance (perf) to education quality (quality). This becomes a good basis to test the research hypotheses.

Table 6. Significance of the coefficients of latent variables

Regression Weights:	Estimate	S.E.	C.R.
quality <------- perf	0.601	0.115	5.212
perf <---------- lead	0.638	0.310	2.063
perf <---------- com	0.017	0.123	0.137
perf <---------- envi	0.115	0.193	0.597
perf <---------- proc	-0.176	0.123	-1.432

4.5 Testing Research Hypotheses

Main research hypothesis of this study indicates that the causative factors of education quality contribute influences to the resultant factor of education satisfaction quality, and sub-hypotheses are formulated to test the partial influences among latent variables.

4.5.1 Testing sub-hypotheses

(1) Sub-hypothesis 1: Education leadership (lead) has an influence on scholastic performance (perf).

As shown in Table 6, the estimate of regression coefficient, saying the influence power of education leadership to scholastic performance, is 0.638, where standard error is 0.310 and CR is 2.063 (bigger than 1.96 (CR of significance level, 5%)), so is very significant. Therefore, the hypothesis that education leadership has an influence on the scholastic performance of students is significant.

(2) Sub-hypothesis 2: Process improvement (proc) has an influence on scholastic performance (perf).

As shown in Table 6, estimate of regression coefficients, saying influence power of education process to scholastic performance, is -0.176 where standard error is 0.123 and CR is -1.432. As this CR is smaller than 1.96 (significance level, 5%), it is not significant at the significance level, 5%. Therefore, dare and rough conclusion is that improvement of education process, unfortunately, has no significant influence upon scholastic performance in Korea.

(3) Sub-hypothesis 3: Education environment (envi) has an influence on scholastic performance(perf).

As shown Table 6, estimates of the regression coefficients, saying influence power of the physical education environment is 0.115 where standard error is 0.193 and CR 0.597 is smaller than 1.96 (significance level, 5%), is insignificant. Therefore the hypothesis that physical environment in schools, has significant influence to scholastic performance of students, is invalid.

(4) Sub-hypothesis 4: Community participation (comi) has an influence on scholastic performance(perf).

As shown Table 6, estimates of the regression coefficients, expressing the influence power of community participation in scholastic performance, 0.017 where standard error is 0.310 and CR 0.137 is smaller than that of the significance level of 5%. So this hypothesis is insignificant. Therefore, hypothesis that community and parent participation has influence on scholastic performance of students is insignificant statistically.

(5) Sub-hypothesis 5: Scholastic performance (perf) has influence on education quality (quality).

As shown Table 6, estimates of the regression coefficient, expressing the influence power of scholastic performance to education quality satisfaction, is 0.601 where standard error is

0.115 and CR 5.212 is bigger than that of the significance level of 5%. Thus the hypothesis that, in the Korean education environment, education quality satisfaction is influenced by scholastic performance of our students is significant.

(6) **Research hypothesis**: Causal factors of education quality effect education quality through the instrumentality of scholastic performance.

Table 7 below explains the level of influences among factors. This presents only the relationship among all the regression coefficients collectively. Thus we can achieve conclusion by summarizing the above-mentioned test results from all the sub-hypotheses. Education leadership and education environment, .i.e. principal leadership in high school and physical environment, effect the scholastic achievements of students, and then the result of the students' achievement effects the education quality satisfaction of universities and other corporate entities.

Table 7. Effects among latent variables

Total Effects

	Comi	Envi	Proc	Lead	Perf	Quality
perf	0.017	0.115	-0.176	0.638	0.000	0.000
quality	0.010	0.069	-0.106	0.384	0.601	0.000

Direct Effects

	Comi	Envi	Proc	Lead	Perf	Quality
perf	0.017	0.115	-0.176	0.638	0.000	0.000
quality	0.010	0.000	0.000	0.000	0.601	0.000

Indirect Effects

	Comi	Envi	Proc	Lead	Perf	Quality
perf	0.000	0.000	0.000	0.000	0.000	0.000
quality	0.010	0.069	-0.106	0.384	0.601	0.000

4.5.2 Conclusion of hypotheses tests.

As shown in the above tests, the reality of Korean education is revealed straightforwardly. Education leadership, that is, the principal's leadership, is an important and significant causative factor of education quality. This causative factor (additionally physical environment factor can be included) effects the scholastic achievement of students, and their scholastic achievement effects the education quality satisfaction of potential education, universities and corporate entities. This is a typical phenomenon of Korean education.

This result is similar to that of previous research [16] but only education leadership factor is significant in the causal relationship. This means that SEM analysis is more sensitive than

the traditional mean approach used in previous research. Because standard error is magnified more than that of the traditional approach and makes other estimates near to the critical point insignificant.

5. Conclusion

5.1 Summary and Suggestions

This study integrated the quality factors suggested in existing literature and analyzed their causality among the quality factors. First this study designed a research model by integrating factors suggested in the existing literature. In other words, Lee et al. (2000) and Wunder (1997) investigated the relationship among education quality factors via empirical survey, but they did not investigate for causality among these factors but only enumerated upon those all factors. Therefore, the purpose of this study is to establish a complement of their study that is lacking causality analysis and tries to compare difference between traditional mean approach and SEM.

After an empirical survey of this study, even though restricted in its survey area, the principal's leadership is very important causative factor in Korean education. So this causative factor effects students' scholastic achievement, and their scholastic achievement furthermore becomes the explaining factor of our education quality. So we can find that Korean education wants very strong leadership in school, who has to drive all the school members to achieve scholastic performance, especially, college admission. This is a real and practical consequence, which is significantly different from the usual educational doctrine that the improvement of the education process is the most important factor of education quality. This fact is also revealed in the preference criteria of middle school students in the Daegu region, where the entrance examination regime is an equalized system. That is, the most important criteria for selecting a high school are superiority in the preparation of the college entrance examination. This fact is a new one that was not revealed even in the study of Lee et al. (2000), which has the same survey objects. Also, scholastic achievement is closely related with the respondents' perception regarding education quality, in which the number of students who entered the first grade university is the same context as universities and firms want to have. The ideal image of school is one of being of a higher level in all aspects of quality factors, so much effort to improve all the quality factors is needed.

Since the survey of this study is restricted only to groups related with high school, we can acquire more interesting results by including other groups such as colleges and universities.

5.2 Limitations and Future Research Directions

This study extracted the education quality factors, surveyed for the empirical test and analyzed the causal relationships among factors using AMOS. Event though the result of this study is difficult to generalize in the Korean situation, it can become a starting point for the quality of education in Korea.

Limitations and future research directions are as follows:

First, any future survey must be extended to the other areas such as vocational high schools, middle schools, elementary schools and colleges. Then the results can be generalized more reasonably. Second, the sample should be designed efficiently to represent respective strata of populations and to guarantee objectiveness. Survey of this study was performed according to distribution convenience. Third, a longitudinal study is necessary in order to track the trend of education quality. Fourth, a model which comprehends all factors in the education practices should be developed and be used as a basis of the TQM movement in education service.

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