Analysis of the Image of Classroom Space of Elementary School and Students' Happiness

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Abstract

The classroom space of the school is a place where students stay for the longest and learn and form social relationships. In addition, the classroom space has become more important in recent years with regard to the development of creativity and the promotion of happiness as a learning environment for students. Therefore, this study analyzed elementary school students'perception of the image of classroom space through semantic differential method and examined the effect of the image of classroom on students' subjective happiness through regression analysis. The results of this study are as follows. First, elementary school students responded most positively to the image of the classroom space in terms of 'joyful' in the evaluation factor, 'lively' in the potency factor, and 'motivated' in the activity factor. Second, the difference in average according to gender showed that male students perceived that the classroom was more 'concentrated' than female students. Third, in terms of the difference in the average according to the grades, the image of the classroom space was more positive for the fourth grade than for the fifth or sixth grade. Fourth, as a result of factor analysis of the image of the classroom space of elementary school students, it was categorized into five factors of 'diversity', 'interest', 'stability', 'aesthetics' and 'openness'. Fifth, the more positive the students' image of the classroom space, the higher the subjective happiness of students. This study will promote the interest and improvement of the classroom space.

Keywords: classroom space; elementary school; regression analysis; semantic differential method; students' happiness

1. Introduction

The place where students spend most of their time is school. In particular, classrooms in the school are the places where students stay the longest. Classroom is a place for students to learn and form and develop social relationships, as well as spaces for rest and play. In this way, as students interact with the classroom space, students can accumulate various learning and experiences. Classrooms can be seen as educational spaces. The OECD (2006) defines "educational spaces" as "a physical space that supports multiple and diverse teaching and learning programmes and pedagogies, including current technologies; one that demonstrates optimal, cost-effective building performance and operation over time; one that respects and is

in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants." (p.1)

One of the most important aspects of the classroom could be creativity. Creativity is not an invariant characteristic of an individual, but an ability to change by environment. Especially as the intellectual ability develops rapidly in connection with creativity when children's age is between 7 and 12 years old, adequate support for education, curriculum and educational environment is needed. The school not only provides students with a stimulus for thinking through the physical environment, but also stimulates and fosters their creativity through an atmosphere that allows them to create creative products. The importance of elementary school curriculum and educational environment is becoming more important as a cornerstone for fostering creative and imaginative talents suitable for creativity development. However, the elementary school has not been changed at all from the standard of school facilities and the standard design drawings of the 1960s and 1970s, even after repeated efforts and changes in education (Kim & Kim, 2016).

Nevertheless, research on the creative environment is being actively conducted. The creative environment is an external factor that positively influences the process of expressing or embodying creativity (Park, 1998). The study of the creative environment has given more attention to the intangible psychological environment that most scholars are formed between humans or external conditions such as human and family, society, culture and history, rather than the physical environment (Amabile, 1989; Hennessey, 2003).

However, the study of physical space is important in that it can deepen the understanding of the interactions with the psychological, emotional, and cognitive elements that make up the learning environments. Weinstein (1981) proposed that physical environments can influence learning by moderating social, psychological and instructional variables. In this respect, it is necessary for students to find out how they perceive the classroom space as a physical environment for improving the creative educational environment in the future. However, in the preceding studies, studies on students' perception of the classroom space are insufficient.

On the other hand, one of the main purposes of education is to raise happy people who realize the highest good. Education should not only increase children's subjective level of happiness but also promote normative happiness towards meaningful and valuable lives, and cultivate children's ability to actively act on reality in order to achieve happiness (Lee, 2008). It is also reported that the schools' physical environment influences the subjective happiness of these students (Yoon, Jung, Yoon, & Roh, 2009).

As such, the school environment is an important variable that is related to the development of the creativity and the improvement of happiness of the students, and it will be meaningful to find out the perception of the classroom space where the students stay in the longest time of the school environment.

Therefore, this study is to examine the image of elementary school students' classroom space and how the image of classroom space affects the subjective happiness of students. The contents of the study are as follows. First, it analysed the image of elementary school students' classroom

space. Second, the sub image items of the classroom space of elementary school students were categorized into several factors, and the sub image factors were examined mean difference according to gender and grade. Third, it analysed how the image of elementary school students' classroom space affects their subjective happiness.

2. RESEARCH DESIGN & METHODS

2.1 Subjects

The research subjects consisted of 801 Korean elementary school students in Seoul metropolitan area and Jeon nam province. Of the 801 students, 399(49.8%) were male while 402(50.1%) were female. By grade level, 239(29.8%) were 4th grade, 285(35.6%) were 5th grade, 277(34.6%) were 6th grade.

2.2 Measurements

The image of the classroom is a self-reported questionnaire that measures how students feel about the classroom space. It consists of 32 questions. The semantic discrimination scale consists of a group of adjectives that can express feelings about classroom space. The adjectives extracted from Osgood's (1957) study were revised and supplemented for this study. It consists of elements of evaluation, activity, and potency and is a seven-point scale. Each item's response is a measure of rating and putting the positive and negative adjectives on the seven-level continuum that can express the feeling of the classroom. Each adjective has 1 point for the most negative and 7 points for the most positive. Cronbach's α was .966 as a measure of overall reliability of the scale. For the happiness of students, we used seven questions about subjective happiness from the Children-Youth Happiness Index (Korea Bangjeonghwan Foundation, 2016) that is on a five-point Likert scale. The Cronbach's α of happiness in this study was .786.

2.3 Data Collection and Analysis

In order to investigate the image of the classroom, a survey was administered to students from September 16, 2019 to October 16, 2019. Descriptive statistics, correlation analysis, reliability, t-test, ANOVA, exploratory factor analysis, and regression were conducted using SPSS Statistics 23.0. We also investigated confirmatory factor analysis using AMOS 23.0.

3. RESULT

3.1 Score analysis of classroom space images

3.1.1 Image of classroom space perceived by elementary school students

The classroom space image of elementary school students is shown in <Table 1>.

As a result of the image response to the classroom space, all of them showed 5 or more points except for 'normal-unique'. The 5 points mean somewhat positive (as 4 being neutral), indicating that students feel somewhat positive about the classroom.

In terms of each factor, first of all, students responded most positively to 'joyful' (M = 5.86, SD = 1.24) in the evaluative factor. On the other hand, 'normal-unique' (M = 4.75, SD = 1.66) was found to have a neutral feeling. In the potency factor, students responded most positively to 'lively' (M = 5.92, SD = 1.24). In the potency factor, all adjectives scored 5 or more, which showed a positive feeling for the classroom space for its potency aspect. In the activity factor, students responded most positively to 'motivated' (M = 5.51, SD = 1.35). In the activity factor, the average of all adjectives was over 5, indicating that students perceived the classroom space positively in terms of its activity aspect.

Table 1: Image of elementary school students' classroom space

	ranking	Images of the elementary classroom space		M	SD
evaluation	1	painful	joyful	5.86	1.24
	2	lonely	together	5.82	1.26
	3	dark	bright	5.79	1.24
	4	not happy	happy	5.73	1.26
	5	unfriendly	friendly	5.72	1.29
	6	dangerous	safe	5.62	1.31
	7	boring	funny	5.60	1.43
	8	bad	good	5.55	1.24
	9	uncomfortable	comfortable	5.53	1.34
	10	unstable	stable	5.50	1.26
	11	not harmonious	harmonious	5.49	1.25
	12	negative	positive	5.44	1.27
	13	ugly	beautiful	5.20	1.27
	14	unclean	clean	5.10	1.36
	15	untidy	orderly	5.06	1.51
	16	normal	unique	4.75	1.66
potency	1	stagnant	lively	5.92	1.24
	2	monotonous	variety	5.57	1.36
	3	deficient	sufficient	5.47	1.38
	4	not convenient	convenient	5.47	1.34
	5	poor	abundant	5.43	1.28
	6	weak	strong	5.35	1.28
	7	hard	soft	5.22	1.37
	8	difficult to concentrate	well concentrated	5.06	1.45

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activity	1	helpless	motivated	5.51	1.35
	2	closed	open	5.51	1.25
	3	complicated	simple	5.26	1.42
	4	old	new	5.24	1.50
	5	controlled	permissible	5.24	1.39
	6	busy	laid back	5.22	1.52
	7	competitive	cooperative	5.14	1.52
	8	passive	active	5.10	1.40

3.1.2 Comparison of classroom space images by gender

As a result of the t-test to see if there is a difference in the image of the classroom space that male and female students perceive, the male students showed a higher recognition that the classroom is more 'well concentrated' than the female students (male M = 5.17, SD = 1.50, female M = .4.96, SD = 1.41). This difference was statistically significant at the p <.05 level.

Table 2: Difference in classroom space image by gender (t-test)

factor	classroom image		group	M	SD	N	t	p
evaluation	ugly	beautiful	male	5.14	1.30	397	-1.366	0.172
			female	5.26	1.23	402		
	bad	good	male	5.47	1.28	398	-1.761	0.079
			female	5.63	1.19	399		
	dark	bright	male	5.74	1.31	389	-1.265	0.206
			female	5.85	1.18	394		
	unclean	clean	male	5.14	1.41	390	0.694	0.488
			female	5.07	1.32	395		
	boring	funny	male	5.57	1.54	392	-0.689	0.491
			female	5.64	1.32	399		
	unfriendly	friendly	male	5.63	1.41	393	-1.949	0.052
			female	5.80	1.16	399		
	painful	joyful	male	5.81	1.36	393	-1.228	0.22
			female	5.91	1.11	399		
	dangerous	safe	male	5.57	1.38	397	-0.999	0.318
			female	5.66	1.24	397		
	not happy	happy	male	5.69	1.37	395	-1.004	0.316
			female	5.78	1.13	393		
	normal	unique	male	4.76	1.66	391	0.316	0.752
			female	4.73	1.67	396		
	negative	positive	male	5.39	1.36	393	-0.909	0.363
			female	5.48	1.19	392		
	not harmonious	harmonious	male	5.45	1.28	394	-0.783	0.434
			female	5.52	1.22	395		
	uncomfortable	comfortable	male	5.50	1.39	394	-0.551	0.582
			female	5.55	1.29	400		
	untidy	orderly	male	5.11	1.51	393	0.952	0.341
			female	5.01	1.50	399		
	unstable	stable	male	5.47	1.32	393	-0.567	0.571
			female	5.52	1.19	395		
	lonely	together	male	5.81	1.30	393	-0.123	0.902
			female	5.83	1.22	395		
potency			male	5.42	1.32	390	1.596	0.111

			female	5.28	1.24	400		
weak	strong							
hard	soft	male	5.16	1.44	395	-1.272	0.204
		female	5.29	1.30	399		
poor	abundant	male	5.40	1.34	392	-0.752	0.452
		female	5.46	1.21	399		
monotonous	variety	male	5.51	1.39	395	-1.193	0.233
		female	5.63	1.32	396		
deficient	sufficient	male	5.54	1.41	389	1.348	0.178
		female	5.41	1.35	400		
stagnant	lively	male	5.88	1.28	395	-1.07	0.285
		female	5.97	1.20	399		
not convenient	convenient	male	5.43	1.43	392	-0.984	0.326
		female	5.52	1.25	398		
difficult to concentrate	well concentrated	male	5.17	1.50	391	1.999*	0.046
		female	4.96	1.41	400		
activity	old	new	male	5.25	1.53	394	0.181	0.856
		female	5.23	1.48	401		
passive	active	male	5.09	1.47	395	-0.168	0.867
		female	5.11	1.32	399		
helpless	motivated	male	5.50	1.39	395	-0.116	0.907
		female	5.51	1.31	402		
competitive	cooperative	male	5.13	1.60	396	-0.08	0.936
		female	5.14	1.43	400		
controlled	permissible	male	5.28	1.45	388	0.705	0.481
		female	5.21	1.33	398		
closed	open	male	5.54	1.28	394	0.543	0.588
		female	5.49	1.22	400		
complicated	simple	male	5.25	1.51	395	-0.044	0.965
		female	5.26	1.33	396		
busy	laid back	male	5.21	1.64	395	-0.207	0.836
		female	5.23	1.40	400		

$^*p < .05$

3.1.3   Comparison of classroom space images by grade

A variance analysis was conducted at the significance level of .05 to verify whether there was a difference in classroom image according to grade level. The group of adjectives showing the difference by grade was conducted post-test. As a result of the analysis of variance first, in the evaluation factor, 'beautiful', 'good', 'bright', 'clean', 'funny', 'joyful', 'safe', 'happy', 'positive', 'comfortable', 'untidy', and 'together' showed the differences by grade. In particular, it can be seen that the fourth graders feel that the image of the classroom space is more beautiful, better, and orderly than what the fifth or sixth graders feel. In the potency factor, there were differences in 'soft', 'rich', 'sufficient', 'convenient', and 'well concentrated'. Fourth graders, in particular, agreed to better concentration compared to fifth or sixth graders. In the activity factors, 'new', 'cooperative', 'permissible', 'open', 'simple', and 'laid back ' items were differed by grade. In particular, the fourth graders perceived the image of the classroom as a new one more than the fifth or sixth graders.

Table 3: Difference in classroom space image by grade (ANOVA)

factor	classroom image		group	M	SD	N	*F*	Scheffe/Tamhane
evaluation	ugly	beautiful	4th grade	5.51	1.20	237	10.516***	4>5, 4>6
			5th grade	5.05	1.27	285		
			6th grade	5.09	1.28	277		
	bad	good	4th grade	5.85	1.08	236	10.244***	4>5, 4>6
			5th grade	5.41	1.30	284		
			6th grade	5.43	1.25	277		
	dark	bright	4th grade	5.96	1.10	231	3.811*	4>5
			5th grade	5.66	1.31	280		
			6th grade	5.79	1.28	272		
	unclean	clean	4th grade	5.34	1.39	235	5.482**	4>5
			5th grade	4.96	1.27	281		
			6th grade	5.04	1.41	269		
	boring	funny	4th grade	5.89	1.24	233	7.707***	4>5, 4>6
			5th grade	5.40	1.47	283		
			6th grade	5.57	1.50	275		
	unfriendly	friendly	4th grade	5.79	1.24	236	2.029	
			5th grade	5.59	1.40	282		
			6th grade	5.78	1.21	274		
	painful	joyful	4th grade	6.09	1.07	234	5.838**	4>5, 4>6
			5th grade	5.73	1.31	285		
			6th grade	5.81	1.27	273		
	dangerous	safe	4th grade	5.91	1.19	236	9.377***	4>5, 4>6
			5th grade	5.42	1.43	283		
			6th grade	5.57	1.25	275		
	not happy	happy	4th grade	6.00	1.12	232	7.307**	4>5, 4>6
			5th grade	5.60	1.35	281		
			6th grade	5.64	1.24	275		
	normal	unique	4th grade	4.60	1.70	236	1.345	
			5th grade	4.81	1.64	279		
			6th grade	4.81	1.64	272		
	negative	positive	4th grade	5.71	1.10	233	11.421***	4>5, 6>5
			5th grade	5.18	1.37	280		
			6th grade	5.47	1.26	272		
	not harmonious	harmonious	4th grade	5.61	1.18	233	1.941	
			5th grade	5.39	1.33	283		
			6th grade	5.48	1.22	273		
	uncomfortable	comfortable	4th grade	5.74	1.24	237	4.460*	4>5, 4>6
			5th grade	5.42	1.33	283		
			6th grade	5.45	1.41	274		
	untidy	orderly	4th grade	5.58	1.25	234	21.306***	4>5, 4>6
			5th grade	4.83	1.55	284		
			6th grade	4.84	1.55	274		
	unstable	stable	4th grade	5.78	1.18	238	8.978***	4>5, 4>6
			5th grade	5.36	1.29	277		
			6th grade	5.38	1.25	273		
	lonely	together	4th grade	6.04	1.23	232	5.170**	4>5, 4>6
			5th grade	5.76	1.27	279		
			6th grade	5.70	1.25	277		
potency	weak	strong	4th grade	5.47	1.28	231	1.768	
			5th grade	5.33	1.31	285		
			6th grade	5.26	1.24	274		

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	hard	soft	4th grade	5.47	1.33	235	
			5th grade	5.06	1.41	284	5.943**	4>5
			6th grade	5.19	1.33	275	
	poor	abundant	4th grade	5.61	1.20	231	
			5th grade	5.33	1.29	283	3.382*	4>5
			6th grade	5.38	1.31	277	
	monotonous	variety	4th grade	5.66	1.31	232	
			5th grade	5.49	1.42	284	0.928	
			6th grade	5.58	1.33	275	
	deficient	sufficient	4th grade	5.76	1.27	234	
			5th grade	5.30	1.44	283	7.528***	4>5, 4>6
			6th grade	5.40	1.37	272	
	stagnant	lively	4th grade	6.03	1.19	235	
			5th grade	5.90	1.24	282	1.196	
			6th grade	5.86	1.28	277	
	not convenient	convenient	4th grade	5.71	1.31	237	
			5th grade	5.38	1.38	279	5.262**	4>5, 4>6
			6th grade	5.37	1.31	274	
	difficult to concentrate	well concentrated	4th grade	5.43	1.34	234	
			5th grade	4.91	1.50	283	10.603***	4>5, 4>6
			6th grade	4.91	1.45	274	
activity	old	new	4th grade	5.40	1.42	235	
			5th grade	5.36	1.43	284	6.068**	4>6, 5>6
			6th grade	4.99	1.61	276	
	passive	active	4th grade	5.26	1.31	235	
			5th grade	4.99	1.43	284	2.610	
			6th grade	5.08	1.43	275	
	helpless	motivated	4th grade	5.52	1.22	235	
			5th grade	5.56	1.37	285	0.485	
			6th grade	5.45	1.43	277	
	competitive	cooperative	4th grade	5.37	1.45	238	
			5th grade	4.95	1.54	282	5.021**	4>5
			6th grade	5.12	1.53	276	
	controlled	permissible	4th grade	5.45	1.27	234	
			5th grade	5.06	1.43	277	5.098**	4>5
			6th grade	5.25	1.42	275	
	closed	open	4th grade	5.71	1.18	235	
			5th grade	5.41	1.23	285	4.533*	4>5, 4>6
			6th grade	5.44	1.29	274	
	complicated	simple	4th grade	5.46	1.38	236	
			5th grade	5.16	1.46	281	3.449*	4>5
			6th grade	5.18	1.40	274	
	busy	laid back	4th grade	5.47	1.42	238	
			5th grade	5.10	1.60	281	4.448*	4>5, 4>6
			6th grade	5.13	1.52	276	

$^{*}p < .05,$ $^{**}p < .01,$ $^{***}p < .001$

3.2 Exploratory and Confirmatory Factor Analysis of classroom space images

3.2.1 Exploratory Factor Analysis (EFA) of classroom space images

An exploratory factor analysis was conducted to identify the components of perception of classroom images. An exploratory factor analysis was conducted with 32 questions. First, KMO (Kaiser-Meyer-Olkin) and Bartlett's test of sphericity was conducted. In this study, the KMO measurement was .970, close to 1, confirming the appropriateness of the sample. Bartlett's test of sphericity result also rejected the null hypothesis at .05 level, indicating that the use of the correlation matrix was appropriate. An exploratory factor analysis was performed repeatedly, specifying the number of factors as 3 to 5. As a result, the five factor structures were found to be the most appropriate, based on the appropriateness of model and interpretation ($\chi 2= 707.179$, df=320, p=.000, RMSEA=.045).

As a result of the exploratory factor analysis with five factors, item 24 with factor loading lower than .30 was considered insufficient to explain the factor and was removed. Finally, the scale consists of five factors with a total of 31 items. These five factors accounted for about 65% of the total variance. The reliability coefficients of all the factors of this scale were between .788 and .907. Since the reliability coefficients were over .70, the reliability was confirmed to be good. The factor coefficient matrix and the reliability results of the exploratory factor analysis are shown in <Table 4>.

Table 4: The factor coefficient matrix of the exploratory factor analysis and reliability

	classroom image		factor1	factor 2	factor 3	factor 4	factor 5	Commu nalities	Cronbac h's α
20	monotonous	variety	0.754	-0.054	-0.053	0.018	0.072	0.684	
19	poor	abundant	0.631	-0.027	0.129	0.056	0.103	0.683	
21	deficient	sufficient	0.626	0.019	-0.001	0.16	0.184	0.703	
25	old	new	0.584	0.098	0.184	0.09	0.046	0.496	
17	weak	strong	0.552	-0.046	-0.051	0.086	0.083	0.437	
10	normal	unique	0.544	-0.088	-0.02	-0.047	-0.056	0.288	0.907
23	not convenient	convenient	0.506	-0.046	0.303	-0.024	0.119	0.664	
22	stagnant	lively	0.471	-0.264	-0.128	-0.026	0.244	0.63	
18	hard	soft	0.364	-0.071	0.318	0.072	0.117	0.588	
26	passive	active	0.323	0.005	0.113	0.084	0.281	0.457	
7	painful	joyful	0.051	-0.822	0.033	0.1	-0.065	0.785	
6	unfriendly	friendly	-0.016	-0.619	0.143	0.035	0.097	0.601	
9	not happy	happy	0.151	-0.595	0.058	0.113	0.066	0.71	
5	boring	funny	0.161	-0.59	-0.063	0.182	0.061	0.669	0.902
3	dark	bright	0.022	-0.374	0.033	0.263	0.143	0.475	
16	lonely	together	0.109	-0.325	0.174	-0.056	0.216	0.434	
12	not harmonious	harmonious	0.221	-0.318	0.313	0.008	0.095	0.613	
15	unstable	stable	-0.021	-0.143	0.686	0.031	0.124	0.734	0.856
14	untidy	orderly	0.161	0.016	0.671	0.119	-0.003	0.663	

8	dangerous	safe	-0.08	-0.055	0.491	0.145	0.1	0.406	
13	uncomfortable	comfortable	0.142	-0.302	0.424	-0.125	0.177	0.633	
11	negative	positive	0.022	-0.31	0.314	0.048	0.219	0.564	
1	ugly	beautiful	0.078	-0.058	0.032	0.678	0.07	0.647	
2	bad	good	-0.014	-0.298	0.083	0.561	0.067	0.706	0.788
4	unclean	clean	0.133	-0.141	0.297	0.319	-0.038	0.461	
30	closed	open	0.081	-0.042	-0.031	-0.069	0.776	0.665	
31	complicated	simple	-0.08	-0.001	-0.01	0.085	0.748	0.533	
29	controlled	permissible	0.038	-0.013	0.064	0.031	0.673	0.587	0.865
32	busy	laid back	0.041	0.021	0.109	0.05	0.596	0.505	
27	helpless	motivated	0.185	-0.178	-0.066	-0.057	0.537	0.557	
28	competitive	cooperative	0.136	0.059	0.127	0.1	0.522	0.534	
Initial eigen values	total		15.413	1.698	1.267	0.954	0.861		
	%Of variance		49.718	5.478	4.086	3.078	2.777		
	Cumulative%		49.718	55.196	59.282	62.361	65.138		

3.2.2 Confirmatory Factor Analysis (CFA) of classroom space images

A confirmatory factor analysis was conducted to determine the validity of the five-factor structure of 31 items by exploratory factor analysis. The goodness of fit of the model was suitable because of showing a TLI of .916, a CFI of .929, and an RMSEA index of .057. First of all, in order to verify the convergent validity of each item, the factor load between the latent and observed variables was identified. 'normal-unique' was excluded because factor load was .459, which did not satisfy more than .5. The factor load of each item by factor was .606 ~ .839, which was all good. Second, the average variance extracted (AVE) value should be more than .5, and the 5 factor AVE value was good from .525 to .573. Third, the construct reliability (C.R.) should be over .7 (Bae, 2017), and the construct reliability of the 5 factors ranged from .799 to .916, confirming the construct reliability. As a result of confirmatory factor analysis on 5 factors, the convergent validity was confirmed to be good.

Nine items were included in factor 1, seven items were included in factor 2, five items were included in factor 3, three items were included in factor 4, and six items were included in factor 5. Factor 1 is named 'diversity', factor 2 is 'interest', factor 3 is 'stability', factor 4 is 'aesthetic' and factor 5 is 'openness'.

3.3 Verification of factors differences by gender and grade

3.3.1 Comparison of the mean of the factors by gender

The *t*-test was conducted to verify whether there were differences in the mean of the factors according to gender, but there was no statistically significant difference. In other words, there was no difference in the perception of diversity, joy, stability, aesthetic and openness of classroom space according to gender.

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Table 5: Difference in the mean of the factors by gender (t-test)

factor	group	M	SD	N	t	p
factor1 (diversity)	male	5.41	1.08	399	-0.325	0.745
	female	5.43	1.00	402		
factor2 (joy)	male	5.67	1.09	399	-1.236	0.217
	female	5.76	0.94	402		
factor3 (stability)	male	5.41	1.11	399	-0.434	0.665
	female	5.44	1.02	402		
factor4 (aesthetic)	male	5.25	1.12	399	-0.934	0.351
	female	5.32	1.04	402		
factor5 (openness)	male	5.32	1.15	399	0.142	0.887
	female	5.31	1.04	402		

3.3.2   Comparison of classroom space images by grade

Variance analysis was conducted to verify whether there were differences in the mean of the factors according to grade, and difference of the mean according to grade was statistically significant in all factors. Overall, 4th graders perceived the classroom image relatively more positive for each factor than 5th and 6th graders did. In the factor3(stability), the difference between the 4th grader and the other graders was especially evident.

Table 6: Difference in the mean of the factors by grad (ANOVA)

factor	group	M	SD	N	F	Scheffe/Tamhane
factor1 (diversity)	4th grade	5.60	0.95	239	4.961**	4>5, 4>6
	5th grade	5.35	1.06	285		
	6th grade	5.35	1.08	277		
factor2 (joy)	4th grade	5.90	0.88	239	6.428**	4>5, 4>6
	5th grade	5.59	1.09	285		
	6th grade	5.68	1.03	277		
factor3 (stability)	4th grade	5.74	0.90	239	16.254***	4>5, 4>6
	5th grade	5.24	1.14	285		
	6th grade	5.34	1.07	277		
factor4 (aesthetic)	4th grade	5.57	0.99	239	12.132***	4>5, 4>6
	5th grade	5.15	1.08	285		
	6th grade	5.19	1.12	277		
factor5 (openness)	4th grade	5.50	0.99	239	4.953**	4>5, 4>6
	5th grade	5.21	1.10	285		
	6th grade	5.27	1.16	277		

$^*p < .05, \ ^{**}p < .01, \ ^{***}p < .001$

3.4 Impact of classroom space image on happiness

A simple regression analysis was conducted to examine the effects of the classroom space image on the subjective happiness of students. Before the regression analysis, the autocorrelation of the dependent variable was reviewed using Durbin-Watson index. As a result,

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1.890 (dv= 1.884 < d) was found to be independent without autocorrelation, so this data was suitable for regression analysis.

As a result of the regression analysis on the effect of the classroom space image on the subjective happiness of the students, the classroom space image had a significant effect on the subjective happiness of the students (p <.001). The more positive the image of the classroom space (B = .377), the higher the subjective happiness of the students. The image of classroom space perceived by students explains subjective happiness, and the explanation power was 30.2%.

Table 7: the regression analysis on the effect of the classroom space image on the happiness (N=762)

	B	SE	β	t	p
(Constant)	2.032	0.115		17.714	0
Classroom image	0.377	0.021	0.55	18.138	<.001
R^2= .302 (R_{adj}^2=.301), F= 328.972 ($p < .001$)					

Durbin-Watson = 1.890 (d_v = 1.884)

4. Conclusion and Discussion

The purpose of this study was to examine the image of the classroom space recognized by elementary school students and to investigate the effect of the image of the classroom space on the subjective happiness of the students.

First, elementary school students responded most positively to the image of the classroom space in terms of ' joyful ' in the evaluation factor, ' lively ' in the potency factor, and 'motivated' in the activity factor. The overall image of the classroom space was found to be positive. It is important to note, however, that the relatively 'unique' was found to be the lowest rated. This can be seen as a negative perception of students about classroom spaces, such as rectangular boxes, identical anywhere in the country, and shows a need for new space design for children to feel a diversity of learning space.

Second, the average difference in the image of classroom space according to gender showed that male students perceived that the classroom was more concentrated than female students. In Jo's (2015) work, the image of school, not classroom, was analyzed that female students had higher perceptions overall and for sub factors than male students, and there were significant differences in evaluation and potency factors by gender. However, in this study, there was no difference in evaluation, activity, and potency factors except for ' well concentrated ', which means that male and female students perceive similarly about classroom space.

Third, the 4th graders perceived more positively than the 5th or 6th graders in the means of classroom space images. This result is similar to the previous research (Jo, 2015; Jwa, 2008) that positively perceives school and classroom space as the grade is lower. A decrease in the perception of classroom space as the school year progresses may have led to a decrease in positive perceptions of classroom space due to academic stress. While physical development of

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students is rapidly progressed and social communication increases, the positive perception of the classroom is reduced because the classroom space is not expanded.

Fourth, when categorizing items in the semantic discrimination of the image of the classroom space, they appear as five factors, and they are named 'diversity', ' joy', 'stability', 'aesthetic', and 'openness'. These factors were found to be similar to the physical environment attributes to enhance creativity (Choi, 2016). except for aesthetic.

Fifth, as a result of examining whether the mean of each factor score differs by gender and grade, there was no difference according to gender, but there was a difference according to grade. Overall, 4th graders were relatively more positive for each factor than 5th and 6th graders. In the factor3(stability), the difference between the 4th grader and the other graders was especially evident.

Sixth, the more positive the image of the classroom space perceived by students, the higher the subjective happiness of students. In other words, the more positively they perceived classroom space, the higher the happiness of students. This is congruent with the study (Sung & Kim, 2013) that one of the school environments, the physical environment of the school, can affect the happiness of adolescents. This reminds us that the classroom should be designed for not only a place for effective learning, but also an important place for the happiness of the students. Therefore, it is necessary to raise interest in the classroom space related to the happiness of students and to actively reflect and improve the opinions of the students when the classroom space is restructured.

Based on the results of this study, the following suggestions can be drawn.

First, the positive perception of classroom space was relatively low as the grade became higher. This may be due to higher academic stress or lower satisfaction with school life. This calls for a need to restructure classroom space for the higher grader. Particularly in most schools in Korea, the restructuring of school spaces has been usually done in classrooms of lower grade, but the restructuring of classrooms of higher grade should also be considered.

Second, this study was to investigate elementary school students' perception of classroom space status quo. In future research, more research on which items of image need to be improved in classroom space should be conducted.

Finally, follow-up studies on how perceptions of classroom space relate to psychological, emotional, and cognitive variables, especially creativity, will help improve classroom space.

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