

A Comparative Study on the Correlation in Curriculum and Architectural Space Between Waldorf School and Korean Elementary School

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Abstract: The Ministry of Education of the Korean Government established and announced the “2015 Revised Educational Course” in September 2015 with the purpose of correcting the problem in which today’s children who are in the initial period of the 4th Industrial Revolution easily get information using tablet PCs and smart phones and improving the modern educational system in which knowledge only is emphasized rather than feeling and senses. The study focuses not only on the educational ideas, goals and contents of Rudolf Steiner’s “Waldorf Schools” which are the model of harmoniously developing a child’s body, soul and spirit in the 21st century but also on the characteristics of the educational courses and architectural space and the principle of color in order to analyze the concept of architectural space of Waldorf School. In addition, the study reviews the goals and educational contents in the elementary schools in the 2015 Revised Curriculum in Korea having the goal of “Developing the Creative and Convergence Type Human Resources” and analyzes the concept of architectural space of elementary school which responds to the changes in the various teaching and learning methods and activities in the actual schools. Based on these reviews and the analysis results as well as the researcher’s experience in the design of schools, the researchers try to find out the architectural relation between elementary schools in Korea which change depending on the changing educational courses and Waldorf School and its applicability to the elementary schools in Korea in order to develop it into a creative special concept in the architectural space in the schools in Korea.

Key words: 2015 Revised Curriculum, architectural space, Waldorf School, Korea Elementary School, correlation, concept

INTRODUCTION

Preface: The traditional education in Korea was conducted in an architectural space which was eco-friendly and human focused such as Seodang, Hyanggyo and Seowon under the educational philosophy of “Benefit all mankind”. But while undergoing a difficult environment such as Japanese colonial period and Korean War, the Korean educational system produced a uniform architectural space or “teaching space” which emphasized functionality and efficiency only in teaching rather than focusing on the emotion and personality of students for the training of human resources in the rapid industrialization period.

In 1997, a period of informatization, the Korean government announced the 7th educational course based on self-rule and creativity.

In 2009, there was the most comprehensive revision of the education course. In addition, there were 16 small and big revisions in the education system, thus, starting

the evolution of the architectural space focusing on the students in a way that the students can conduct various teaching and learning methods and activities. In September 2015, the Korean government announced the “2015 Revised Curriculum” thus, leading to the learning space focusing on the students with respect to the various educational courses (Song and Jung, 2017; Jung and Song, 2015, 2017).

These days or in the initial period of the 4th Industrial Revolution, our children tend not to use their own senses and feelings but get output easily with the easy use of big data through the widely spread tablet PCs and smart phones, thus, making them not develop their internal senses and personality but being more individualized. This phenomenon indicates that there are problems with the architectural space which does not cope with the various teaching and learning methods and activities in the education courses among others.

So, this study is designed to make the educational environment in a way that the children can develop their

bodies, spirits and minds in a harmonious way to deal with the rapid changes in the various teaching and learning methods and activities in the educational courses and schools. The study focuses not only on the educational ideas, goals and contents of Rudolf Steiner's "Waldorf Schools" which are the model of right education, 'education and arts' and educational reform in the 21st century but also on the characteristics of educational courses and architectural space through Steiner's anthroposophical architecture and the analysis of the principle of color (Song and Jung, 2017). This study focuses on the research on the educational environment of elementary schools and the architectural space taking into consideration the educational objectives and educational contents of elementary and middle schools in the 2015 Revised Curriculum as well as the researcher's experience in the design of elementary schools in order to find out the correlation in the school's architectural space between elementary schools in Korea which changes depending on the change in the educational policy and the educational courses and Waldorf School and its applicability.

Educational curriculum and architectural characteristics of Rudolf Steiner's free Waldorf schools (Song and Jung, 2017)

Goals and characteristics of the educational courses of Waldorf schools (Song and Jung, 2017): The goals of the education are as follows; The first goal is education for 'wholeness'. The education constitutes the frame of educational procedure in a way that the children can grow to be a "whole human being".

The second one is 'integrity'. The education should help the children to get a sense of consistency between the world of idea existing inside of them and the outside world through various experience activities and work-oriented activities, thus, helping them to create a unique knowledge of their own.

The third goal is 'education based on life'. The education shall help the children to experience detailed situations at the developmental stage to get an understanding of life and future vision and also get a variety of helps in getting future vocational activities when they become adults. The fourth goal is 'art education'. It is the most critical educational goal and principle in Waldorf schools. The education shall be made based on these four education goals to help the children to understand human's internal essence and core and develop the quality as good human beings (Kim, 2001).

"First stage-children prior to entering school (0-7 years old). During this period, the children attain physical completion and the growth of the sensory system. What

is the most important thing in the children's education is to stimulate the children's internal imitation behavior and imitation learning using examples and imitation and also provide the children with education putting priority on individuality.

"Second stage (1st-8th grade). During this period, the students think about something through 'images' and learn them through 'sense (feeling: Fuhlen). Therefore, the main principal of learning during this period is 'image-construction (illustration)'. All studying data shall be artistically structured and the studying contents shall be described and formed in a graphical way.

Third stage (9th~13th grade). During this period, conceptual science is handled as if it has abstractive logic. The contents of education for the children ranging from 10th-11th grade are more differentiated (fragmented) in consideration of the fact that the students are in the puberty period (Kim, 2004).

Key educational contents of characteristic subject, activity and subject and the architectural measures (Song and Jung, 2017): The characteristic subjects and activity areas are as follows; The first one is Epochenunterricht class. In this class, the students take the lesson of one subject only for 2-3 h every morning during 3-5 weeks to the physical rhythm of the students for each of the main subjects.

The second one is the Formen class which uses the line for each grade. It is the class where the students draw figures using crayons. During the class, the students color the basic forms such as straight line and curved line with the thickness of 1 cm. They sometimes apply the technique to letters and numbers.

As the students proceed to go up in the grade they combine the complicated lines to make many shapes and forms.

The third one is Eurythmic class. As the movement arts devised by Steiner, it is a kind of emotional movement behavior. It is designed to integrate the human's internal experience of feeling sound with the external movement visible from outside. In this class, the children naturally learn cooperation and harmony instead of competition. The fourth one is art and music class. The music class is given to all students across all grades regardless of the regular timetable. The priority is given not only to music but also to all art subjects including painting. As the source of all educations, art is emphasized and is approached in an artistic way (Woo and Chang, 2016).

The education for each subject can be classified into human and nature, subject class focusing on events, various experiences and living practices and activity class including creation using real materials (Table 1 and 2 and Fig. 1 and 2).

Table 1: Key contents of the subject in the curriculu of Waldorf School and architectural response-1 (Song and Jung, 2017; Kim, 2004)

Subject	Description	Architectural easures
Language	This helps children to get the ability of experiencing the sense and spirit of language and get an expressive ethod having nuance	General classroom (different structure for different grade)
Foreign language	This helps children to get a new nuance and thought acquisition through experience through iitation, graar and reading of poes depending on their developmental stage	General classroom (different structure for different grade)
Math	This helps students to learn things using rhythic play in an interesting and happy way. The children get an education on abstract nubers and calculation through specific senses	General classroom (different structure for different grade)
Nature Geography	This course is ade for the children of 9 years old or ore who are recognized as an independent huan. It focuses on helping the children to experience anials, plant, soil and season through illustrations	General classroom-middle level grade (different structure for different grade)
History (history of fine art)	This is education focusing on events, thus showing that history is ade by huans and the environent along with geography	General classroom-high level grade (different structure for different grade)
Physics Cheistry	This course is given to the children of 12 years old or above who are in the stage of physical aturity. It is related to actual lives of huans	Special classroom-high level grade (theory/practice/experience)
Home econoics	This focuses on huan's actual life to help children to get the senses of creativity, productivity and preciseness	This focuses on huan's actual life to help children to get the senses of creativity, productivity and preciseness

Table 2: Key contents of the subject in the curriculu of Waldorf School and architectural response-2 (Song and Jung, 2017; Kim, 2004)

Subject	Description	Architectural easures
Technology Practice	This akes up for the fact that urban civilization separates huan fro nature It helps children to feel nature fro anials and flowers	Special classroom-middle level grade (theory/practice/experience)
Arts and Crafts	This is conducted focusing on the encouragement of children to get a sense of creativity, productivity and preciseness	Special class (theory/practice/experience)
Music	This is conducted for the children so that usic can be enjoyed as a purpose on its own not as a eans on the preise that the frae of a huan being is ade according to the law of music	Special class (theory/practice/experience)
Fine art	This course shall be conducted for both the artistic approach education and the lesson on physics and cheistry or other subjects related to fine art siultaneously	Special class (theory/practice/experience)
PT Eurythy	This is the education of eotional oveent and art in which children can get the mind and body to grow together	Multi-purpose performance hall (theory/practice/experience)
Religion	This is perfomed on the preise that the children can be ade ethically perfect through religion. Classes on catholicis, christianity and other religions are conducted	Multi-purpose performance hall (theory/practice/experience)

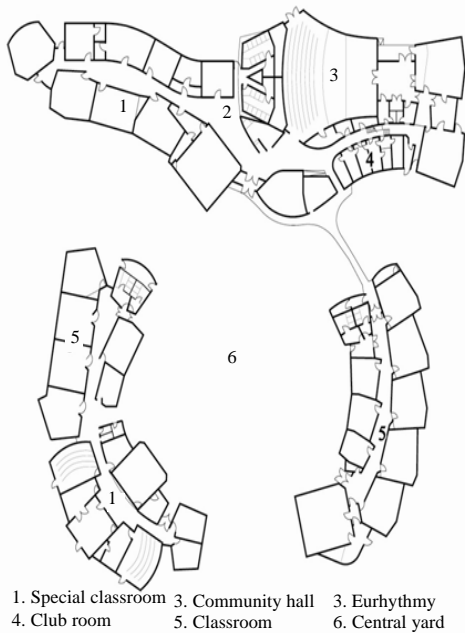


Fig. 1: Cases of Waldorf School, Munich and general classroom by grade-1 (Song and Jung, 2017; Anonymous, 2015)

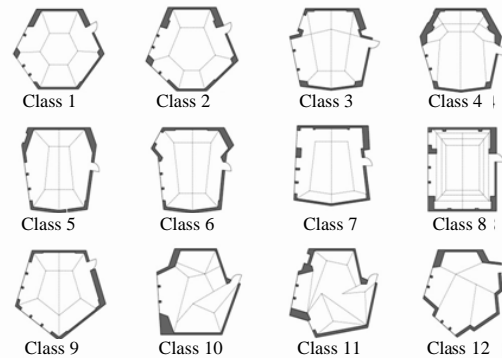


Fig. 2: Cases of Waldorf School, Munich and general classroom by grade-2 (Song and Jung, 2017; Anonymous, 2015)

MATERIALS AND METHODS

Elementary school curriculum and architectural characteristics focusing on the 2015 Revised Curriculum

Goals and characteristics of the elementary school curriculum focusing on the 2015 Revised Curriculum:

The education in the elementary school focuses on the development of the basic habit and basic ability required

Table 3: 2015 Revised Curriculum's connection to the Nuri curriculum and the education on safety and software

Classification/Main revisions	Methods and ain educational contents	Architectural responses
Education program		
Connection between the educational course in elementary school and Nuri curriculum	Emphasis on the education of Hangeul for 1st and 2nd graders (group)	Plan on the expansion of the connection (care) of Hangeul classroom (Nuri curriculum) in the low grade school area
Strengthening the connection with the early childhood education (Nuri curriculum)		
Establishment and strengthening of safety surrounding and education in elementary school	Forcing and operating "Safe life" class for 1st and 2nd graders Education on 4 fields including life, traffic, safety against disaster	Function of safety experience for low grade students Experience of space plan (connection to outside space) Sharing the experience of space/audio and visual room
Strengthening the software education focusing on ICT	Expansion of the course on information for use of ICT to the basic contents of software	Strengthening the computer room (newly establishing the main server control room) Strengthening the practical course room

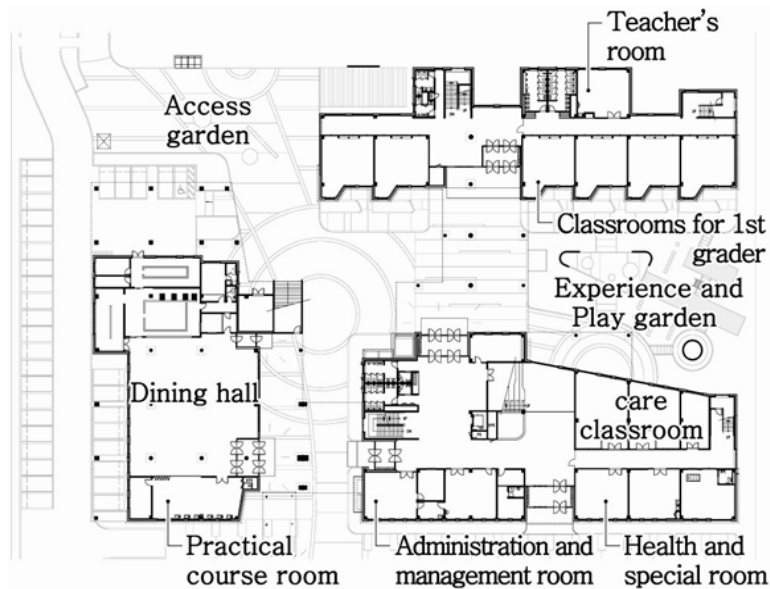


Fig. 3: Layout of the Yongjeon elementary school and cases of general classroom by grade-1

for learning and the daily life of the students as well as on the right personality. The "2015 Revised Curriculum" focuses on the education of Hangeul for 1st and 2nd graders with the goal of "strengthening the basic personality of the children on the humanistic, social and science and technology fields" and strengthens the connection with the early childhood education (Nuri curriculum) to concentrate on the education of Hangeul. It also establishes the education on safety consciousness and topics and experiences of life habits and consciousness on life, traffic, surrounding and safety, so that, the students can actually prepare against natural disasters. In addition, it made changes in order to strengthen the basic education on software focusing on ICT use in the practical courses. The main educational courses and contents in the 2015 Revised Curriculum and the corresponding architectural space can be summarized as follows (Jung and Song, 2015) (Table 3).

Key contents of education for each subject and the architectural responses: The elementary schools in Korea focus on the development of basic habit and capability required for the daily life of the students and learning as well as the understanding of the precious value of the student and a healthy life habit. It also concentrates on finding the problems in learning and daily life, developing the basic capability for solving them and developing the power of imagination, so that, the student can get new experiences. In addition, it aims for the students to grow a mind in which they can enjoy various cultural activities and feel the beauty and happiness in nature and comply with rules and orders and help each other based on the mind of cooperation (Sin, 2016) (Fig. 3).

The education on subjects can be classified into the general subjects which are designed for students to find problems in nature and daily life and solve them and the

Table 4: Key contents of the subject in the curriculu of korea eleentary school and architectural response

Subjects	Educational contents	Architectural responses
Korean	Class in which learning naturally happens during activities. Strengthening the education on Hangul for 1st and 2nd graders connected to the Nuri curriculu and class on play	General classroom (Presentation/debate/discussion)
English	Expanding the educational eleents in listening and speaking Strengthening the English conversation ability in real life	General and special classroom (Theory/practice/experience)
Math	Class related to Nuri curriculum Study raising their usefulness in real life	General and special classroosm (Presentation/debate/discussion)
Social Studies and Moral Science	Coprehensive access, territory and unification education focusing on the topics. Learning considering the student's developmental stage Education for failiarization of skills for experients Learning connecting the curiosity about natural phoenoen to basic scientific concept	General classroom (Presentation/debate/discussion) Special classroom (Presentation/debate/discussion)
Practical Course	Education for failiarization of skills for experients Learning of the curiosity about real life through the experience of real life	Special classroom(Presentation/debate/discussion)
Music	Education on the development of artistic sense through expression and appreciation activities	Special classroom (Presentation/debate/discussion)
Fine Art	Education on usical sense and capability and cultural counity capability Developent of artistic sense through expression, appreciation and critical activities Developent of the understanding capability of artistic sense and artistic culture	Special classroom (Presentation/debate/discussion)
PE	Education on topic and experience by establishing the safety course Theoretical and experience education including the relation between sports science and huan and the understanding of culture	Multi-purpose classroo (theory/practice/experience)
Creative Experience (safe life)	Creative experience activities in various fields such as safe life, self-rule activity, club activity, volunteer activity and future job activities.	Club room (Presentation/debate/discussion)
Right Life	Practical education for counity capability, self-control capability and counication capability by foring the basic habit required for life and learning	General classroom-low grade students (Presentation/debate/discussion)
Wise life	Understanding social phoenoen and natural phoenoen by continuously studying the world focusing on real life	General classroom-low grade students (Presentation/debate/discussion)
Happy life	Developing the basic expression capability required for daily life and cultural education through the experience of beauty and physical expression activities	General classroo-low grade students (Presentation/debate/discussion)

various creative experience activities such as safety in life, self-rule, club, service and future job activities (Table 4 and Fig. 4).

Characteristics of architectural space between elementary schools in Korea and Waldorf school

Characteristics of architectural space at Waldorf school (Song and Jung, 2017): It may be said that the architecture of Waldorf School in the initial period contribute to the role of architecture making human being mentalized based on the Steiner's anthroposophical world view. Goetheanum which fully shows the characteristics of Steiner's architecture is based on the Goethe's concept of change. It may be considered as the essence of Steiner's anthroposophy.

The Steiner architecture has been understood as the organic architecture or expressive architecture by many researchers. Steiner's Waldorf School in its initial period pursued for the characteristics of organic architecture and anthroposophical architecture in which the materials existing in nature and the composition of the curved line and space are the same as those in the system of organic living things (Jung, 2012, 2013, 2016, 2017).

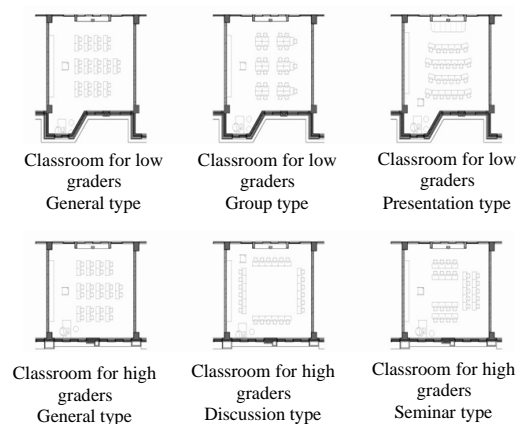


Fig. 4: Layout of the Yongjeon Elementary School and cases of general classroom by grade-1

The characteristics of its architectural space are as follows; In the center area are located the multipurpose hall (student community hall) and multi-purpose performance hall (eurythmy, play, performance, lecture and various school events).

Then, there are the grade classrooms having different shapes and colors depending on the grade of students and various special classrooms for art, work and practices. The space is composed of eco-friendly architectural spaces.

As for the shape and composition of general classrooms, the general classroom is relatively big with a size big enough to accommodate 34-40 students and its shape and color vary depending on the grade of students based on Steiner's idea on cycling that they shall change according to the change of the learning group depending on the developmental stage of the children and the characteristics of the subject (Ryu, 2017).

Its characteristics of color are as follows; Based on Steiner's theory of color which argues that color is formed by the action of cognition in addition to physical phenomenon, the colors of yellow, blue and red were used as the unique colors of materials or the colors of green, black, white and apricot were used as images (Kim, 2004).

The classroom is often applied with the Lazure painting technique based on the color of white. The classrooms for 1st graders are applied with red and the color changes to brighter ones as the grade goes up. So, the color of orange, yellow, green, blue, violet and purple are applied to connect the children's infinite imagination to color, thus removing the disconnection between grades but organically connecting them. This architectural space can be a learning experience for the students in another form (Sin, 2016).

In summary, the architectural space of Waldorf Schools is organic and vital. As it always changes, there is no typical form of school architect. All Waldorf schools located around the world have different individualistic buildings under the idea of freedom, integrity and art education in different cultures and environments. But they have common characteristics as they are 'flexible artistic buildings containing the Steiner's anthroposophical education idea and educational courses (Woo and Chang, 2016).

Characteristics of educational course and architectural space of elementary schools in Korea: The school architecture in Korea was designed with a uniform architectural layout style such as the rectangular layout, straight hallway, playground located in the center of the school and layout of the student's desk straight line toward the lecture desk with the emphasis on function and efficiency for the development of human resources for the period of industrialization from the date when the 1st educational courses was announced in 1954 until 1992 when the 6th educational course is announced (Jung, 2013). The 7th educational course was designed to focus

on the students based on self-rule and creativity in 1997. It started to evolve into the student focused architectural space while undergoing 16 small and big revisions including the biggest revision in 2009.

The characteristics of the architectural space are as follows: the arrangement of library and computer room on the 1st floor or the main traffic area to strengthen the student's creativity and personality, the location of experience rooms for music, fine art and practical course in the place where children can feel comfortable, arrangement of various open spaces for communication with local residents, expansion of the hallway which is not just the way for traffic but also the space for exchange between students and teachers and between students, arrangement of the stage for multi-purpose expression at the center of educational building which is an expansion of the traffic route between floors, arrangement of English experience classroom in preparation of the period of globalization and the space and community for multi-cultural home students, home of multi-purpose gymnasium and outside athletic facilities which are for good health and other students-focused architectural space which can accommodate various educational courses as well as Crime Prevention Through Environmental Design (CEPTED), green architecture, zero energy school considering the safety and environment, thus leading to the space for the hub of local community and the space for lifelong educational space.

As for the characteristics of color, there is no consistent standard or rule for the application of color. The color is just selected in consultation with architect and the color professional group by granting an identity to each school. There should be a continuous research and comparative study on the cases of various colors lately applied to the newly constructed school to find out how color would affect the students.

In summary, there is no typical architectural style for the elementary schools in Korea. The elementary schools in Korea become the space for developing the human resources having "creativity and convergence capability" equipped with the emotional and personality education, considering the acceptance of Korea's education course and changes in the space for the future schools as well as the hub space of the local community with the goals of focusing on the various designs in terms of shape, space and color considering the students centered space for creating the creativity experiencing space and the space for the color design.

RESULTS AND DISCUSSION

The findings and discussion about applicable architectural proposals are as follows. The correlation between Waldorf School and Korean Elementary Schools

Table 5: Correlation in architectural space between Waldorf School and Korea Eleentary School and applicable architectural responses

Classification of correlation	Waldorf school	Eleentary school in Korea	Applicable architectural responses
Layout plan and space composition of educational buildings	Layout in the curved form after the natural shape Connection to broad outside space General schools having different shape for each grade considering the developmental stage	Straight layout mainly directed toward the south Classroom for low graders, administrative room and some special classrooms connected to the outside space	Various lay out plans are required, thus, linking to the outside environment Various cluster plan for each grade
Color plan	Use of Steiner's principle of color Lazure painting technique organic connection between grades such as Red/pink/yellow/green/blue/violet/purple	No clear standard or rule Application of identity to each school in consultation with architect and color expert Main color/ auxiliary color	Planning the color design guideline for school architecture considering the emotion and personality
Space composition of community	Layout in the form of interconnection like ivy centering on the central hall and large performance hall Various special classrooms Making the comfortable mood like home	Layout focusing on management and administrative office, classroom for low graders, dining hall and some special classrooms	Plan of the students-focused community space centering on the lower floors of education building Plan of facility opened to local community
Harony with the surrounding environment	Single-story and two-story buildings Harony with natural environment	3-story or 4-story buildings Narrow space	Expansion of land size Layout of classroo for the experience of nature and real life on the first floor
Ecological space composition	Using as it is Various experience of nature and research	Use of outside space; Design of landscaping based on the green architecture Experience and research of ecological space	

was analyzed in terms of the educational goal and educational course and the various teaching and learning methods.

First, as for the “layout plan and space composition”, the space in Waldorf School is made after a natural curved shape and there is a comfortable learning space like home such as general classroom and special classroom for each grade in various forms, considering the learning and teaching method according to the children’s developmental stage.

On the other hand, the elementary school in Korea try to make various designs considering the surroundings, teaching and learning method and the children’s experience activities but most architectural space is laid out, directed toward the south, thus, emphasizing the function and efficiency and using the standardized materials and furniture for easy management, budget and workability.

Second, as for the “color plan”, based on Steiner’s principle on color and the emphasis of endless imagination and connectivity, the Waldorf school ensures that there is no disconnection between grades.

On the other hand, in the elementary schools in Korea, an identity is granted to each school by architects and professional color group considering the child’s emotion and personality without the special standard or rule on the application of color.

Third, as for the “space composition of community”, the Waldorf School is laid out in a way that according to Steiner’s spirit, various forms of classrooms including general classrooms and special classrooms are arranged in the form of clusters like ivy centering on the central hall

and large performance hall for the social features and the community mind for the community people (parents, members and local residents, etc.) .

On the other hand, in the elementary schools in Korea, the space is made in a way for enhancing the community mind which is a little different for each school, considering the shape of land such as the hall focusing on the management and administration and the classrooms for low graders and some special classrooms.

Fourth, as for “harmony with the surrounding environment and ecological space”, the Waldorf school is harmonized with the ambient natural environment as it is made with the single-story and two-story buildings. The general classroom and special classroom which are the organic architectural space are directly and indirectly connected with nature that the various kinds of studies are carried out including the experience of real life and research activities.

On the other hand, most of newly established elementary schools in Korea lack the space for directly connection to nature except the classroom for low graders, some special classrooms, care classroom, health rom, consulting room, special class and dining hall because the space for the school is located in urban areas has small land size and the administration room should be located on the first floor (Table 5).

CONCLUSION

Based on the findings from the comparison above, the architectural space which can be applied to the elementary school in Korea are as follows.

First, there should be a layout for considering the learning of real life subject and experience focused on the students and various teaching method including experience of nature and researches in terms of theory, presentation and discussion. Further, the various variable learning space should be planned which can prepare for the change in the educational course at the future schools.

Second, now the color design of the school is done without any clear standard or rule. Therefore, through continuous researches and comparative study on the cases of school's color plan, a color guideline plan should be made focusing on students in a way that the students can feel the endless imagination, concentration on learning and comfort and warmth.

Third, the space plan shall be made in a way that the school can be the hub space of the local community and open space with resident and lifelong education facility for resident as well as the various resting and learning space which can give comfort to people like home for the activation of community between teachers and students and between students themselves.

Fourth, the space design should focus on the eco-friendly green architectural space plan considering the surrounding environment and natural environment and it should be made in a way that the first floor easily accessible to the parent and local residents is granted for use as the space for the student community and various special classrooms instead of management and administration space. The space shall be designed for use as the space for social features and community conscience opened to the community while considering their safety.

In conclusion, the basic concept of the architectural space of personality and emotion such as space for learning about real life, the space for exchanges for the enhancement of community mind, space for arts and sports convergence and space for experiencing nature and research should be applied to the future school's architectural space which should create a new space for ICT environment and smart classroom to suit the changes in the educational courses which are caused by the large change such as the 4th Industrial Revolution. In the future, more detailed studies on the continuous research on the Waldorf school's architectural space and the cases of architectural space for elementary schools in Korea and comparative studies are needed to identify more applicability of the findings to the architectural space of elementary schools in Korea.

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