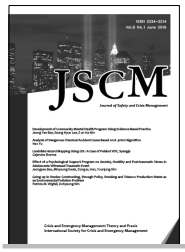

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Review on the School Noise Standards and Measurement Methods for Educational Environment Protection System

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A B S T R A C T

The evaluation of noise and vibration in the educational environment is the effect of traffic noise that can be exposed during school operation in the case of a new school and the effect of noise at the construction site during construction in the case of an existing school. The evaluation criteria apply the environmental standards of the Basic Law for Environmental Policy and the regulatory standards based on the Noise and Vibration Regulation Law for noise and vibration in the teaching area. In addition, when measuring noise with a sound level meter, various factors interfere with the measurement values, such as the geometrical positional relationship between the noise source and the sound-receiving point (classroom), the structure of the classroom envelope, the size of the window, the sound absorption capacity of the classroom, the sound insulation performance of the window, the area of the open window, the noise incidence angle, inside air quality and air volume in addition to occurrence of unexpected variables. These factors are not at all accounted into the legal standards, causing the negative damaging influences to the members of the school, and significantly deteriorate the right to study and education. Therefore, it is necessary to review the indiscrepancies in noise standards and measurement methods prescribed by each law related to the school noise.

Key words: educational environment protection system, school health act, framework act on environmental policy, act on noise and vibration management, environmental impact assessment method

Introduction

School provides a learning ground where school life takes place, and various activities such as learning, reading, conversation, school lunch, and breaks are carried out. Accordingly, the demand for facilities and equipment is increasing. In this way, it is the school life environment that is prepared and provided to meet the needs of students and promote their welfare in schools, and based on the recognition of the problems that arise, the educational environment evaluation system[1)] in accordance with the School Health Act and the Education Environment Act is being implemented. School facilities are places where students spend most of their time while they grow up and study, greatly influences students to develop emotionally and physically, therefore maintaining a pleasant indoor environment is significantly important. The level

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of the indoor environment affects not only students' health but also their learning efficiency. In particular, classrooms are enclosed spaces with high density of occupants, and because they stay for a long time, they are easily exposed to pollutants such as heat and CO2 from surrounding traffic and various daily noises (Na, 2007: 295-302). Recently, as fine dust-related legislation passed the National Assembly and fine dust was included in social disasters, an amendment to the School Health Law, which mandated the installation of fine dust meters and air purifiers in school classrooms, was also passed. Accordingly, each school is promoting the installation of air purification devices. In addition, the Ministry of Education's 'Public Notice on Installation and Operation of School Air Purifiers, etc.' states that installing a product that does not interfere with the learning environment requires the noise level of the air purifier less than 55dB(A) by referring to KS and group standard certification standards (Ministry of Education, 2019). However, as can be seen from the Gyeonggi Office of Education's suspension of introduction of ventilation facilities in schools, a problem has been raised that products exceeding 55dB(A) are generated as a result of field measurement. There is also an investigation result indicating that in the heat exchange ventilator, noise may be generated when air communicates with the heat exchange device and piping (Park, 2016: 15-17).

Noise reduction measures for school facilities are established in accordance with the Framework Act on Environmental Policy in the environmental impact assessment stage, while noise reduction measures are established in the management stage by the School Health Act and the Noise and Vibration Management Act. In the School Health Act, the results of measuring background noise inside the classroom are based on the open window condition. However, if the outdoor noise standard in the environmental impact assessment stage is set to the standard specified in Article 25 [Annex 11] of the Enforcement Regulations of the Noise and Vibration Control Act, noise of at least 13dB(A) or more to meet the indoor noise standard in the School Health Act at the management stage will require to install windows with attenuation effect. Therefore, in the environmental impact assessment stage, noise reduction measures are established based on the predicted noise level of 55dB(A) from the exterior wall of the school building.[2] However, when sound waves are introduced through open windows, the difference in indoor and outdoor noise levels is determined by the influence of various architectural design factors such as building arrangement, window size and shape, interior finishing materials, classroom size, and furniture arrangement. To meet the end, it is important to accurately identify the difference in noise levels in and outside the classroom applied as a correction value in order to establish an appropriate noise reduction countermeasure if necessary and whether the noise introduced into the classroom satisfies the noise standard.

In light of the specificity and purpose of the school as an educational facility, smooth communication between teachers and students is an important contribution among many factors that affect students' academic efficiency and achievement. However, environmental noise, noise from equipment in classrooms, noise from disturbances between students, and the reverberation of sounds that affect voice transmission can be a hindrance to creating a pleasant educational environment (Lee, 2013: 842-843). In this regard, the result of conducting a basic study on the introduction of indoor acoustic evaluation indicators and standards through a method of evaluating acoustic performance based on the background noise and reverberation time in the classroom indicates that the standards related to domestic acoustic performance give rise to the importance of acoustic performance in the classroom. It reveals the limitations of the School Health Act and creates the necessity of specific experiments and evaluation indicators (Lee, 2015: 462-468).

The American Acoustical Society and the British Ministry of Education adopted various standards that have been established and applied as the classroom acoustic performance evaluation indicators for background noise and reverberation time measured with the window closed, sound insulation performance between classrooms, and sound insulation performance of floor impact noise. Bradley, *et. al.* (2004) suggested that background noise has a greater influence on speech perception than reverberation time in a study on speech perception of students in classroom (Bradley, 2004: 1191-1194; Bradley, 1999: 1820-1828; Yang, 2009: 922-933; Lee, 2018: 460, re-quoted). Korea has no such standards related to classroom acoustic performance other than the School Health Act (Lee, 2013: 842-843; Lee, 2018: 460-467). Therefore, based on the results of systematic noise measurement and noise measurement, measurement and standards are needed in consideration of various factors such as the location relationship between the noise source and the classroom, and the structure of the classroom. However, with respect to the regulation of noise in schools, regulations on noise differ among laws such as the School Health Act, the Framework act on environmental policy, and the Noise and Vibration Control Act.

1) In order to more fundamentally secure and preserve the school's learning environment, the system aims at establishing a school in a relatively pleasant area by evaluating the harmful factors around the school site from the time of selecting a school site.

2) In accordance with Article 3, Paragraph 1, No. 3 of the Enforcement Regulations of the School Health Act, the noise level inside the classroom is set to be less than 55 dB (A), and the method for measuring the noise inside the teacher is specified in the environmental hygiene and food hygiene management manual for the school classroom.

This study will review the current laws regarding school noise standards, and examine priorities between laws and solutions for improving the school noise environment from the legal perspective.

Analysis of laws related to school noise

School means "an institution that provides education to students according to a certain purpose, curriculum, equipment, system, and regulations" in Korean language. In other words, as a space for students, that could be a place to promote academics. Noise cannot be avoided in places where people live, but educational institutions such as schools need to minimize noise due to fulfill its purpose. In this regard, our law stipulates the limit of noise generation as a law, and here again, other laws stipulate school noise. However, the problem persists that the noise standards for school facilities differ between these laws. If so, the question arises of which laws should be applied first and what is more beneficial for the students.

Legal regulations and standards

In the current Korean law, noise is stipulated in the Noise and Vibration Management Act. Based on the act, regulations on noise are partially specified in various laws, the School Health Act, the Framework Act on Environmental Policy, the Noise and Vibration Management Act and the Environmental Impact Assessment in relation to the school that this paper intends to focus.

The School Health Act stipulates that "noise in classrooms is 55dB(A) or less" as a standard for noise in Article 4 and Article 3, Clause 1, No. 3 of the enforcement regulations of the same law. In addition, in Article 12, Paragraph 2 of the Framework Act on Environmental Policy and Article 2 of the Enforcement Decree of the Act, noise is classified into general areas and roadside areas, and each target area is classified as A-D. In addition, the standard is divided into day and night, and is 50dB(A)-40dB(A) in general areas and 65dB(A)-55dB(A) in roadside areas. According to Article 7 of the Noise and Vibration Management Act and Article 8 of the Enforcement Regulations of the same Act, the emission standard for noise and vibration from factories with noise and vibration emission facilities is 50 or less during the day (06:00 to 18:00) by time slot. In the evening (18:00 to 24:00), it is regulated as 45 or less and at night (24:00 to 06:00) 40 or less. The standards for noise and vibration are regulated in Article 26 and Article 25 of the Enforcement Rule of the same Act, divided into roads and railroads. In the case of schools, they are divided into day and night, and are specified as 68dB(A)-58dB(A) in road standards and 70dB(A)-60dB(A) in railroad standards. According to Article 7 of the Noise and Vibration Management Act and Article 8 of the Enforcement Regulations of the same Act, the emission standard for noise and vibration from factories with noise and vibration emission facilities is 50 or less during the day (06:00 to 18:00) by time slot. In the evening (18:00 to 24:00), it is regulated as 45 or less and at night (24:00 to 06:00) 40 or less. The standards for noise and vibration are regulated in Article 26 and Article 25 of the Enforcement Rule of the same Act. In the case of schools, they are divided into roads and railroads, then again divided into day and night, resulting in the specification as 68dB(A)-58dB(A) in road standards and 70dB(A)-60dB(A) in railroad standards. In addition, when establishing and implementing a plan or project that affects the environment, the Environmental Impact Assessment Act predicts and evaluates the impact of the plan and project on the environment in advance. It stipulates that precedent approval by the supervisory authority pursuant to Article 6 or consult with the head of the competent administrative agency.

In addition, the Environmental Impact Assessment Act included noise and vibration management standards from factories and transportation facilities. Accordingly, the standards for the emission limit of noise and vibration from factories and noise and vibration management standards generated by transportation institutions were added to the target of the consultation criteria such as environmental impact assessment.

According to the above-mentioned legal regulations, measures to reduce noise in school facilities are based on the Framework Act on Environmental Policy and the Environmental Impact Assessment Act (→ Framework Act on Environmental Policy based noise standards of the Noise and Vibration Control Act are used as a standard for discussion in the environmental impact assessment stage.) While the measure is established by the Noise and Vibration Management Act, the management and maintaining stage is established by the School Health Act and the Noise and Vibration Management Act in the maintenance and management stage.

However, the problem persists that the noise standards in these laws are not in accordance. None of the School Health Act, the Framework Act on Environmental Policy, the Environmental Impact Assessment Act, and the Noise and Vibration Management Act have clear standards. The School Health Act and Framework Act on Environmental Policy focus on the flow from the inside of the school by the interpretation of the law, whereas the Noise and Vibration Control Act refers to the level of noise coming from outside the school. In other words, there are differences in

how they influence the noise standards. And another problem are two folds - notwithstanding the differences in the way it affects noise standards, merely in terms of the value of dB(A) - Based on the School Health Act as the subject of discussion is a school, ① Low figures from the Framework Act on Environmental Policy shows for the case of, there is a difference that about 5dB(A) is rather low in the case of general areas, while about 10dB(A) is high in the case of roadside areas. ② Based on the Noise and Vibration Control Act, the general area is lower than about 5dB(A) and the rodeside area is 10dB(A) higher in the daytime, and 15dB(A) lower figures are registered in the evening. In the meantime, based on Article 25 of the same Act, the difference in the daytime is that 13dB(A) is higher for roads and 15dB(A) for railroads, showing the opposite guideline.

This difference could be questioned as a trivial difference as it is merely between 13dB(A)-15dB(A) (maximum). However, the difference in this degree applies to commercial and semi-industrial areas that are more than multi-area' in the light of a region' where schools are applied under the Framework Act on Environmental Policy. In the light of the area covered by Article 25, the school is applicable to industrial and distribution development promotion districts such as commercial areas and (semi) industrial areas. That is, the difference between 13dB(A)-15dB(A) could be as significant as the difference between schools and commercial and industrial areas. This is said to be a huge difference similar to the distance from the north and south pole. If so, it is necessary to look into which laws are appropriate for carrying out school facility projects, and what methods are appropriate for measurement.

Legal priority on the application of the laws

Scrutinizing at laws related to school noise are pursuing, the Noise and Vibration Management Act "prevents damage caused by noise and vibration from factories, construction sites, roads, railroads, etc., and manages noise and vibration appropriately to ensure that all citizens live in a quiet and peaceful environment." The School Health Act provides for the purpose of protecting and promoting the health of students and staff by defining matters necessary for school health management. According to the Framework Act on Environmental Policy, "The rights and obligations of the people and the state's responsibility for environmental preservation are clarified, and the basic matters of environmental policy are determined to prevent environmental pollution and environmental damage, and to properly and sustainably manage the environment. The purpose of preservation is to ensure that all citizens can enjoy a healthy and comfortable life." The Environmental Impact Assessment Act states that "when establishing and implementing a plan or project that affects the environment, it predicts and evaluates the impact of the plan and project on the environment in advance and prepares environmental preservation measures." The act aims to promote eco-friendly and sustainable development and a healthy and comfortable life for the people."

The purpose pursued by the laws mentioned above could be seen that noise is a property related to human physical health, corresponding to a living environment related to a person's daily life as an environment. In this regard, this paper targeted school area, and since noise in schools corresponds to environmental sanitation for school members, the Framework Act on Environmental Policy, the School Health Act, the School Facility Project Promotion Act, the Noise and Vibration Management Act, and the Environmental Impact Assessment Act should be prioritized. The legal priority to the school could be stated that the Framework Act on Environmental Policy, the Environmental Impact Assessment Act, and the Noise and Vibration Management Act have priority when it comes to school noise, whereas the School Health Act also takes precedence in ranking. These laws are the basic basis as the main category, and the School Facility Business Promotion Act-as a suboptimal-has the character of supplementing these laws, and should be regarded as such.

Hence, the question can be raised as to how the Framework Act on Environmental Policy, the Environmental Impact Assessment Act, the Noise and Vibration Control Act, and the School Health Act would be ranked. The relationship between the two laws is that the Framework Act on Environmental Policy, as the name of the law implies, is a basic law for matters related to the environment. The School Health Act stipulates matters related to school health management, and the Environmental Impact Assessment Act is based on the Framework Act on Environmental Policy and the Noise and Vibration Control Act as the target standard and stipulated as a standard for consultation. Here, the School Health Act is the regulation body of ventilation, lighting, lighting, temperature and humidity in school facilities [teaching site, gymnasium, classroom, gymnasium, dormitory and food service facility, auditorium installed in teaching facilities or sports ground, etc.]. Prevention and management of harmful substances such as harmful heavy metals, installation and management of water supply and sewage, toilets, pollution of air, asbestos, waste, noise, volatile organic compounds, bacteria, dust, etc. are defined as well as proper maintenance and management of food hygiene.

Accordingly, the School Health Act can be said to be in the position of a special law for the Framework Act on Environmental Policy. In addition, since the Framework Act on Environmental Policy is a basic law as the name suggests, it is a regulation that

has a characteristic of a recommendation and a reference point, but is not a regulation that enforces any action. This point can be also applied to the Environmental Impact Assessment Act and the Noise and Vibration Management Act. This is because the Environmental Impact Assessment Act considers the standards of the Noise and Vibration Control Act as a standard for consultation when it is recognized that it is difficult to maintain the environmental standards in accordance with the Framework Act on Environmental Policy in the area affected by the implementation of the project or when it is recognized that the deterioration of the environment cannot be prevented. In other words, in order to maintain environmental standards and prevent environmental deterioration, it is not a regulation that enforces any action as a regulation for consultation. Based on these grounds, it could be said that the school health law takes precedence between the two laws by the principle of priority in the special law.

However, as mentioned in the above laws and regulations, there is no need to discuss the ranking of priorities because there is a difference in the method between the two laws in the degree to which each law affects the standard of noise stated. In other words, since there is a difference in the method of affecting noise standards between the two laws, it is necessary to apply both methods together in maintaining and managing the environmental hygiene of schools, therefore it should be reasonable to follow as such.

Problems of validity between the School Health Act and the Framework Act on Environmental Policy

Differences in noise evaluation methods and standards

As mentioned earlier, the laws of both the School Health Act and the Framework Act on Environmental Policy have characteristics so that it is not necessary to discuss ranking in discussing the noise standards of schools. However, the question arises is that the method of measuring noise according to the environmental standards stated in the Framework Act on Environmental Policy is different from the method of measuring noise in environmental hygiene stated in the School Health Act. That is, the Framework Act on Environmental Policy includes the measurement method of the School Health Act.

Therefore, as mentioned above, it may raise the question of whether the two laws have a character that does not require a ranking in discussing the noise standards of schools. What is clear, however, is that the standards for measuring noise in the School Health Act are within the classroom environment, and the methods and standards for measuring noise are quite different between the two laws. The question raised here is that the methods of measuring noise are defining the difference between the two laws and whether these measures are valid.

According to the current School Health Act, the method of measuring noise pursuant to Article 4 of the Act is specified in the School Environmental Hygiene and Food Hygiene Inspection Standard'. It is stipulated that the sound scale is a sound level meter of Class 2 specified in KS C IEC 61672-1 or a sound level meter with equivalent or higher performance, and the result of measuring noise in the absence of students by selecting a classroom with a large effect of noise according to the noise environment survey which should be below an average of 55 decibels." On the contrary, according to the Framework Act on Environmental Policy, the method of measuring noise pursuant to Article 12 (2) of the Act is stipulated in the Noise and Vibration Process Test Standards'. By looking at the main points, here, "The sound meter microphone should be directed toward the main noise source.", "In the daytime (06:00-22:00), the number of measurement points is sufficiently determined to represent the local noise. Measured at least 4 times at the measurement point at intervals of 2 hours or more, and the arithmetic mean value is used as the measurement noise. At night time (22:00-06:00), at least 2 times at 2 hour intervals at the measurement point measured at day time where the value obtained by measuring and arithmetic mean is called the measurement noise level." The question here is whether this measurement method is valid.

First, in the case of the School Health Act, the act states that "… The result of measuring noise in the absence of students, etc. by selecting a classroom with a large impact on noise." It is questionable what it means to measure the noise generated in the absence of students, and what kind of noise is measured in this situation is also ambiguous. The meaning of noise is defined as "irregularly mixed, unpleasant and loud sound". The Noise and Vibration Control Act, also defines noise as "the use of machinery, equipment, facilities, and other objects, It refers to an apartment house pursuant to subparagraph 3). It refers to a strong sound generated by people's activities in places determined by the Ordinance of the Ministry of Environment."

In light of the meaning of these noises, the meaning of the regulation "less than 55dB(A) of noise within the classroom" stipulated in the School Health Act refers to the sound generated by human activities within the classrooms. The purpose of measuring noise in empty classrooms aside from choosing a large classroom

is to find out what effect it will have on students and those who are not teachers, or whether the level of noise should be regulated because of the certain level of the effect. This does not constitute a good method. ense. On the other hand, it can be argued that measuring an empty classroom without students is less affected by background noise and reflected sound, and thus increases the accuracy of the noise level in the classroom. However, there is a difference in noise between empty and non-empty spaces, and the purpose of measuring the level of noise is the evaluation of the place where students and faculty members spend time, so that they do not suffer from noise. Even if there is no background noise, the degree of noise is different depending on the reflected sound. That is, even if the same wave is used, the transmission distance or speed of the medium is longer in the empty space than in the other space, so the noise is relatively less generated as iit can be mistaken. Therefore, it is not reasonable to measure noise in an empty classroom.

Next, the Framework Act on Environmental Policy states that "outdoor measurement is in principle, and the general area' is a place that can represent the noise in the area, and in the roadside area', a place that is likely to cause problems due to noise is selected." and "The sound meter microphone should be directed toward the main noise source." Since this criterion is not clear, there is a strong possibility that subjective judgment may take place, so that it works to interpreters' advantage according to the situation. It is also questionable whether the result will be fair or fair as the possibility of manipulation is rich and it can be operated in a biased manner. The meaning of the place indicated by the measuring point in the general area is too abstract, and the standard of the representative place is also unclear. The same is true for roadside areas. This is concern as the term concern itself is very abstract and subjective, implying that there is no standard.

Of course, when selecting a measurement point, it is prescribed to avoid points that are expected to have a significant influence on the noise evaluation in the area. However, as stipulated in Article 2 of the Enforcement Decree of the 「Enforcement Decree of the Framework Act on Environmental Countermeasures」, the range of time zones-although the daytime zones are relatively wider-is wider, and each measurement point in both the daytime and nighttime zones. Measured more than 4 times at intervals of 2 hours or more, and the arithmetic average value is taken as the measurement noise. In particular, during the daytime, only the quieter time period is often selected and measured, so that the average measured value meets the standard value. Deliberately- there is a strong possibility of manipulation. Also, that may not be different in terms of the night time.

This is because the noise measurement time is not limited to a specific time of high noise, but a range called time zone'. In addition, even in the light of the Noise and Vibration Control Act that stipulates the same conditions as area within 50 meters from the boundary of the school site'-based on the Framework Act on Environmental Policy-there is a standard difference of about 30% during the day and 40% at night.

School noise and basic rights

As mentioned above, it can be seen that noise standards related to school noise differ according to laws and regulations. In addition, the method of measuring the noise is also not strictly valid, and there is ample room for polarization. If so, it is necessary to look into whether these points do not infringe on the basic rights of students.

Right to receive education

Article 31 of the Constitution provides for the right to education. Article 31, which stipulates these basic rights, is classified into five categories in detail. As for the representative contents related to the subject of this thesis, paragraph 1 of this article states that "All citizens shall have an equal right to receive an education corresponding to their abilities.", and in paragraph 6 of the same article, "Fundamental matters pertaining to the educational system, including in-school and lifelong education, administration, finance, and the status of classrooms shall be determined by Act." The right to education is the basis for realizing the ideology of a cultural and democratic welfare state by laying the foundation for a human-like cultural and professional life for all citizens, as well as a basic right that is the basis for other basic rights (Kang, 2002: 561). Accordingly, the right to receive education includes the right to study and the right to study, and it becomes a prerequisite such as the right to pursue human dignity and value and happiness, and a life worthy of human beings (Article 34, Paragraph 1 of the Constitution). And since this basic right is a constitutional right as a subjective public authority, it has direct binding power to the state. However, since this basic right is a basic social right, so that it is not a right that applies between individuals, except in the case of Article 34 (1) of the same Act.

Environmental Right

Article 35 of the Constitution stipulates the right to the environment. Paragraph 1 of the Act stipulates that "All citizens

shall have the right to a healthy and pleasant environment. The State and all citizens shall endeavor to protect the environment." Paragraph 3 of the same Act stipulates that "The State shall endeavor to ensure comfortable housing for all citizens through housing development policies and the like."

The environmental right is a basic right that protects the natural and living environment, and is a claim to protect the right to live in a healthy and comfortable environment, rather than the right to dominate the environment itself (Kang, 2002: 592). The environment here includes not only the natural environment, but also the social and cultural living environment, educational environment, and religious environment. And according to the provisions of Article 35, the people have the basic right of freedom as a defensive and passive right to exclude infringement on a certain environment, and at the same time, as a subjective public authority that can actively claim the preservation of such an environment. It is a basic right that has a dual character with basic social rights (Kang, 2002: 593). Therefore, the environmental right has the national effect of requiring the state to prevent the environmental problems caused by all persons who infringe upon the people's living in their own certain environment, and at the same time, it is indirectly applied between individuals. However, it can be said that the state has an obligation to the state and its citizens to endeavor to preserve and manage the environment. The environmental right as a constitutional right can function as a criterion for judging private legal or judicial disputes between individuals (Kang, 2002: 595). In this case, the nature and degree of damage, public and social value of the damage benefit, the aspect of the offense, public and social value of the offense, preventive measures or damage avoidances hould be judged by comprehensively considering all circumstances, such as the possibility of public law, the relationship between public law regulations and licensing, regionality, and the predecessor of land use (Supreme Court, 1995).

Review

Our constitution stipulates the environmental right in Article 35 as a basic social right. This is a claim to protect the right of all citizens to live in a pleasant environment, and the state and citizens are imposing the duty to make efforts to preserve and manage the environment. In other words, it has the basic right of freedom as a passive and defensive right that allows the people to exclude the infringement of the environment against the state, while being an active claim to claim certain benefits for the conservation of the environment and a social basic right as a subjective public right. However, since this right is an abstract right, detailed information and method of exercise are required by law. Therefore, in order for individual citizens to exercise their environmental rights, the subject, target, content, and event method must be specifically and clearly defined in the law. However, since these basic rights are also subject to the general legal reservation principle, it can be said that the purpose is to enjoy the dignity, values, and the right to pursue happiness in Article 10, the first sentence of the Constitution.

If so, the difference and irrelevance of the Framework Act on Environmental Policy and the School Health Act[3] do not fall under the category of national security as it is a problem in relation to the basic rights of those in classrooms. Of course, it is a concept with a passive purpose of preventing disturbance of the existing order of the state and society, and it does not fall under the category of maintenance of order, which means maintaining the well-being and order of public society (Song, 2016: 257), it refers to the restriction of basic rights based on the welfare of the common interest to each citizen while enabling the enjoyment of the people's freedom and rights in the community, only when the exercise of basic rights directly infringes on administrative purposes and public interests. However, if there is only an indirect risk of impairment to administrative order, and public welfare, it falls under the category of excluded public welfare as the justifiable purpose for the restriction of Article 37 (2) is established (Kang, 2002: 333). And since the basic rights of individuals can be limited by the general rules of legal reservation, it is necessary to look into the restrictions on public welfare (Song, 2016: 257-258).

First, in terms of the legitimacy of the purpose and the appropriateness of the method, as stipulated in Article 1 of each Act, each Act has a purpose to be pursued. Therefore, even if there are differences and irrationalities between the Acts, It can be argued that the infringement of basic rights over the subject is not an issue. However, the purpose of the Framework Act on Environmental Policy is to prevent environmental pollution and environmental damage by setting the basic matters of environmental policy, and to ensure that all citizens can enjoy a healthy and comfortable life by managing and preserving the environment in a sustainable manner. In view of the purpose of pursuing the common denominator of 'environment' and the purpose of stipulating matters necessary for school health management to protect and promote the health of students and faculty, the differences and irrelevance between the two laws and regulations may violate the basic rights of students and faculty members, especially when it is limited to the school, the subject and target of this thesis.

3) Hereinafter, the term 'difference and irrelevance' means that the noise standards of the Framework Act on Environmental Policy and the School Health Act are different and the method of measuring the current noise standards is not valid.

It could be argued that the Framework Act on Environmental Policy, as the name of the law suggests, is a basic law, and therefore has only characteristics as a reference guideline, and the law that stipulates related matters based on this has the nature of a special law. As it is a natural phenomenon, one could assert that it does not infringe on the basic right, arguing that this is also a valid method because the noise standard measurement method has a limitation that it has to adopt arithmetic average. However, even if the Basic Law has the characteristics as a reference, when there is a difference of about 20%-30% in the standard of the special law based on, it raises a significant problem. Students and faculty and staff are not able to be said to be in line with the purpose pursued by the law, which has the nature of the special law, since it provides a measure suitable for preventing environmental pollution and environmental damage while protecting the right to live. Hence, it violates the basic rights. Also, in the case of the noise standard measurement method, the uncertainty of the method has a limit in which the actual arithmetic average is inevitable in measuring the noise standard. If calculated arbitrarily or the measured value exceeds the standard, manipulation is possible to meet within the standard range. This also violates the basic rights of students and faculty as it is regulated to allow manipulation. In the classroom of a school, learning information is delivered to learners mainly through the voice of the teacher. However, noise from the outside environment, noise from facilities within the classroom, noise from students, and the sound in the classroom can affect the environment in the classroom. Therefore, although acoustic performance above a certain level is required in the classroom, it is necessary to prepare acoustic performance standards that can be applied according to the purpose of the classroom and various conditions, background noise and reverberation time in the classroom, and sound insulation performance between classrooms. Problems arise as various standards for sound insulation performance of floor impact noise have not been established and applied, and standards related to classroom acoustic performance have not been properly established, other than limiting the noise standard within classrooms to 55dB(A) or less under the School Health Act. (Lee, 2018: 842).

In addition, in order to determine whether the noise standard in the classroom is satisfied according to the current School Health Act, the indoor noise level must be accurately predicted when the window is opened. In general, the outdoor noise level reaching the window is first predicted before the indoor/outdoor noise level. The level difference is corrected to estimate the indoor noise level, and the noise level in the classroom is affected by various factors such as the sound insulation performance of windows, the area of open windows, and the angle of incidence of noise (Cho, 2017: 408). At the same time, it is important to accurately identify the difference between the noise level inside and outside the classroom that is applied as a correction value in order to establish an appropriate noise reduction countermeasure for whether the noise introduced into the classroom satisfies the noise standards and, if necessary, systematic noise measurement and noise in the field. Based on the measurement results, it is necessary to determine the appropriate correction value considering various factors such as the geometrical positional relationship between the noise source and the sound-receiving point (classroom), the structure of the classroom outer shell, the size of the windows and the sound absorption capacity of the classroom (Cho, 2017: 408).

Lee (2018) measured the background noise, reverberation time, and C50 (clarity) in the classroom when opening and closing windows for 12 schools located along the road, and taking into account the condition of the teacher's voice level, U50 (Useful to detrimental sound ratio). At the same time, based on the recommended U50 value, the average C50 (2.44dB) measured at the time of opening the window in the study (Lee, 2018: 460-467) By applying the teacher's voice level (50dB(A)), it corresponds to the upper limit (lower limit of ‘Good’), the median value, and the lower limit of ‘Fair’, which is the middle grade among the five grades (see <Table 1>) proposed in previous research. The appropriate background noise is 43.4 dB(A)-51.1 dB(A). From this, it can be seen that there is a difference from the dB(A) regulation in the current school health law. This means that communication between teachers and learners, such as the transfer of learning information, cannot be performed smoothly, and that noise standards stipulated by the current laws must be questioned.

Also, once a building has been built, it is not easily reversed, except at least by remodeling. In the case of schools, according to the' School Environmental Hygiene and Food Hygiene Inspection Standards, the classroom is managed by homeroom teachers and teachers in charge of classes, and other facilities and places are managed by the environmental hygiene manager designated by the head of the school where they conduct it through the naked eye at least once every school day, and regularly conducts it with a sound level meter at least once in summer as stipulated by the standard.

<Table 1> Background noise level considering window opening conditions and language transmission rate figure

STI	Class	U_{50} [dB]
STI < 0.30	‘Bad’	U_{50} < -8.5
0.30 < STI < 0.45	‘Poor’	-8.5 < U_{50} < -3.5
0.45 < STI < 0.60	‘Fair’	-3.5 < U_{50} < 1.5
0.60 < STI < 0.75	‘Good’	1.5 < U_{50} < 6.5
STI > 0.75	‘Excellent’	6.5 < U_{50} < 11.5

※ Source: Lee, *et. al.* (2018: 461, re-quoted)

However, i) when measuring with a sound level meter, the window is opened and the measurement is performed. The size of the windows, the sound absorption of the classroom, the sound insulation performance of the windows, the area of the open windows, the angle of incidence of noise, the air quality and the amount of air in the space, etc. could influence the measurement values. Even if the school was initially constructed to meet the values and standards by the School Health Act, a number of factors could discredit the initial requirement for the measurement in the classroom.

ii) Even if high-performance equipment is used, the problem still persists. For example, in the case of an air purifier, if a filter with excellent performance is used, the higher the filtration performance, the narrower the net space of the air permeable network becomes, so the resistance of air increases. The pressure of the air delivered to the air is lowered, making it difficult to transfer air to the space (Park, 2018: 9). Therefore, even if a device with good performance is used, the aging progresses in the end. In that case, the noise is eventually generated from the equipment or the original performance of the equipment is deteriorated, and the noise value is bound to increase. Therefore in consideration of such a situation, continuous repair and remuneration must be made to meet the provisions of the law, causing an additional concern.

This can be appeared to be the same even when the measured value varies due to various factors as in the case of i) or when an unexpected situation occurs. As mentioned above, it can be even more problematic in situations where regular inspections are conducted more than once a year. In these respects, in the end, the difference in noise standards between each law such as the School Health Act, the Framework Act on environmental policy, the Noise and Vibration Control Act, and the Environmental Impact Assessment Act is a concern. The measured values differ depending on various factors, causing a problem that the standard limit was uniformly set without taking these circumstances into account. In this regard, it also hinders meeting the purpose of the law, and it may violate the basic rights of students and faculty members.

Next, ii) there are various laws related to school noise in terms of minimal damage, but in terms of direct relevance, only the Framework Act on Environmental Policy and the School Health Act are applicable, so there are differences between the two laws. Impropriety is a major principle of the Constitution and at the same time violates human dignity, values, and the right to pursue happiness, for which the environmental right is aimed for. As previously discussed, there are several laws related to noise, and the Noise and Vibration Control Act is the same as the Framework Act on environmental policy and overlaps the area subject to noise standards. Therefore, it could be seen or acclaimed as there is not much difference in the noise standards.

However, compared to the School Health Act, the Noise and Vibration Management Act has a different purpose to pursue, and there is a difference in the method of the degree of noise that affects noise standards. In addition, as mentioned above, the latter case is larger in terms of numerical difference between the School Health Act, the Framework Act on environmental policy, and the School Health Act and the Noise and Vibration Management Act even only considering the value of dB(A). Basic rights are further infringed upon evaluation. And considering that all things eventually lead to obsolescence, the uncertainty in the legal regulations on how to measure noise standards increases damage in that it eventually goes to the members of the classroom.

In addition, schools are facilities that require a quiet environment for smooth learning activities.[4] Noise is i) an impediment to these learning activities, and may even cause psychological and physical illness to students, and ii) school noise, which has the characteristics of damaging the classroom atmosphere even with small chats by students. The effect of temporary noise rather than continuous noise may harm the learning atmosphere, and iii) school noise can adversely affect the health of youth in the growing season, therefore it should not be overlooked. v) Every hour, the mind is focused on acquiring knowledge, and since the senses are more sensitive, even small things could be a barrier. vi) Even if students focus their attention on the teacher's explanation or student's presentation during class, noise makes it difficult to hear or concentrate as your learning is significantly hindered, and your motivation to learn decreases. i) During class, even if students concentrate their mind on the teacher's explanation or the student's presentation, hearing difficulty could lead to a disturbance in learning and reduced motivation to learn. vii) Continued noise pollution makes nerves sensitive and negatively affects personality formation and personality, and the aftereffects may remain even after adulthood (Kum, 2011; Kim, 2011: 2, re-quoted).

In fact, according to the results of this study, it is necessary to properly control the noise generated by the school and surrounding facilities, the reverberation and reverberation generated in the classroom as noise has a negative effect on learning in various aspects, such as inducing deviant behavior (Lercher, 2003: 725-735; Hygge, 2002: 469-474; Stansfeld, 2003: 243-257). Noise was found to be a negative factor, such as distorting information transfer between teachers and students or obstructing concentration during learning (Julia, 2006: 183-193). This phenomenon, accordingly, becomes an infringement of the right to study and education through the

4) Kim, *et. al.* (2011: 2). For the following, two pages of this paper are summarized and quoted.

right to receive education stipulated in Article 31 of the Constitution. The right delivers on human dignity, values, and the right to pursue happiness. Therefore, the difference and irrelevance of the Framework Act on Environmental Policy and the School Health Act devalues the minimal intrusion that can limit the basic rights of students and faculty members. Lastly, iii) in terms of balance of legal interests, the problems related to school noise are related to the public interest without any doubt, so the differences and irrelevance of the Framework Act on Environmental Policy and the School Health Act prompts unbalanced affect on the basic rights of students and faculty members.

In this regard, if it is to my opinion, then it is necessary to specify the level of appropriate school noise in order to ensure the right to the environment and education of students or the right of teachers. Furthermore, the question should be answered in what measures are there for noise standards and measurement methods? If there is a reasonable criterion, the question can be raised as to whether the criterion should be set. However, there is a problem that cannot be clearly presented as to how the noise standard is. It is only clear that, as I argue in this paper, the standard of 55dB(A) or less, which is the noise standard within classrooms, is not appropriate under the School Health Law.As noise is recognized by a principle that works by feeling unpleasant and feeling noisy toward the sound, it interacts not only the sound but also the surrounding environment and atmosphere at the time. That is, i) even if it is the noise by children, the difference between spending a special time with a loved one in a special place on a special day in a good atmosphere and a situation that yearns for a child or accepts it in a place such as an amusement park, ii) aka white noise could bes divided into [White noise] and Color noise. Even though it is white noise, if one does not like the sound, it causes the difference in perception or acceptance in his propensity to sound as if it is noise, iii) This is because noise affects people differently depending on the difference the person accepts in the certain surroundings. Therefore, for the engineering discipline called school noise standards, the minimum standards must be set as standards other than the noise standards within classrooms under the current School Health Act. After setting up the standard, it is necessary to conduct continuous research on the psychological and physical effects of noise on the members of the teacher and the effects on the learning environment of students.

Conclusion

Noise, one of the pollutants that humans are affected by the environment as they live, is always occurring in our daily life, and we tend to disregard it being something we always encounter. This, of course, can be true in some sense. However, the completely different story lies in the case of places where noise has an adverse effect, such as a school or a library. In these places - in the case of our country - people recognize that noise should not be generated not only from inside but also from outside. However, for even places where considered to be quiet, noise is bound to occur. This is because we are living as a living organism in the environment. If so, the goal should be to reduce this noise as much as possible. In particular, in the case of schools, this purpose is inevitably pursued as teachers and students enjoy the right to education and study through communication with each other. The current school health law stipulates the noise standard in teachers to be less than 55dB(A). However, it is questionable whether these standards are appropriate. The standard limits of each law stipulating noise in relation to school are all different, and the difference in standards to be large even by the standards of the School Health Act. This is because, in measuring the noise standard, the measurement value may vary due to various factors or unexpected situations may occur, and thus, this whole situation is not taken into account even though it may lead to not meeting the standards in the classroom under the School Health Act. Article 31 of our Constitution regulates the right to education, and Article 35 of the same law regulates the right to the environment. Here, since the educational environment belongs to the environmental right, Articles 31 and 35 can be said to lie in a straight line in school education, and this aims to enjoy the dignity and value of human beings and the right to pursue happiness in the first sentence of Article 10 of the Constitution. In the end, the School Health Act set out to be a law to realize these constitutional basic rights. The law must be clear. That is because the principle of rule of law as a constitutional principle stipulated by the Constitution is the pursuit of the clear purpose. And in any case, the measurement is a relationship lying in a straight line that is bound to be influenced by the method. Accordingly, it is necessary to review the differences in noise standards and measurement methods prescribed by each law related to school noise. It is judged that it is necessary to present proposals for legislative or institutional improvement by synthesizing the analysis beyond raising the question of inconsistency between laws and regulations through further research.

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