

# IMPROVING STUDENT OUTCOMES THROUGH EDUCATIONAL ADEQUACY REVIEW STANDARDS FOR SCHOOL FACILITIES

August 2021



OREGON  
DEPARTMENT OF  
EDUCATION

*Oregon achieves . . . together!*

# Table of Contents

Introduction ..... 2

Acoustics and Noise ..... 6

Air Quality ..... 8

Lighting..... 9

Temperature ..... 11

School Capacity and Classroom Space ..... 12

Applying Educational Adequacy Review Standards ..... 14

Additional Resources for Quantitative Measures & Standards ..... 16

*This document was prepared by the Office of School Facilities’ Technical Assistance Program. For further information about the program, please contact [ODE.SchoolFacilities@ode.oregon.gov](mailto:ODE.SchoolFacilities@ode.oregon.gov) or visit the office’s [webpage](#).*

## Introduction

School facilities can have a significant impact on student outcomes affecting health, behavior, engagement, learning, growth, and achievement. Across Oregon, many districts are faced with aging schools that were built to address the educational needs of the past century. The Oregon Department of Education's (ODE) school facilities database shows that approximately 59% of existing schools in 2021 were constructed before 1970. A majority need extensive repair or replacement. Besides general maintenance and construction issues, many schools across the state lack 21<sup>st</sup>-century facilities in the form of infrastructure, laboratories, and instructional space. More than half do not have sufficiently flexible instructional space for effective teaching to take place.

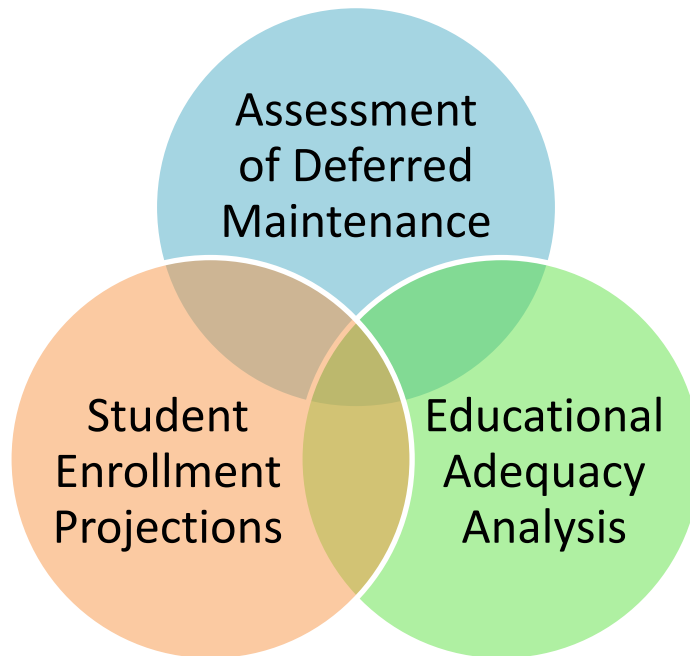
Districts looking to invest in their school facilities need to engage with their communities in long-range capital improvement planning. Together they will prioritize renovation and construction projects for their facilities. This long-range planning process can also address the needs and challenges of 21<sup>st</sup>-century learning models. As part of this process, districts need to understand where their current facilities are not adequate in key aspects that directly affect student learning. Without this understanding of how their facilities operate, beyond a deferred maintenance list, districts will not have a comprehensive picture of what improvements need to be made.

### **Education Adequacy: A Component to Long-Range Facility Planning**

The educational adequacy analysis provides the third major source of information for a comprehensive long-range planning process. The first source of information is a facilities assessment. This is designed to determine the deferred maintenance needs of the facilities in the district. The second source of information is student population projections. This information will help determine whether there are enough facilities and space for the projected growth of the district. The third source of information in determining how adequately facilities perform in key areas that promote student learning. These sources of information provide the basis for the long-range planning process. The district and community, working together take this information and determine what their priorities will be for facilities to meet their shared educational vision for the future.

## Comprehensive Long-Range Facility Planning

*How does each of these components serve the community's educational vision?*



To establish safe and healthy buildings districts and assessors should have a set of criteria that communicates to the public the requirements for school facilities to support student achievement and educational programs. Educational adequacy criteria translate the physical requirements of the educational program into words that enable the district, architect, and public to visualize how the indoor learning environment may impede or advance educational activities. This in turn helps architects and engineers design solutions that better support the community's educational vision.

ODE uses the term, "Educational Adequacy Review Standards" to help districts identify elements that are conducive to a healthy and comfortable indoor learning environment. ODE's goal in establishing Educational Adequacy Review Standards is that they are both flexible and qualitative. They are designed to bring to light the ways that school facilities impact the learning environment. The Educational Adequacy Analysis process also makes this important piece of information available to school districts and their constituents, helping them to recognize and prioritize elements of the indoor learning environment that may otherwise be overlooked.

The Educational Adequacy Review Standards are **NOT** to be confused with construction specifications or seen as requirements that districts must meet. Rather, they help districts and those facilitating discussions around capital planning and improvement, communicate with the public about conditions in the indoor learning environment that may help or hinder student

achievement. According to best practices, the Educational Adequacy Analysis is part of a comprehensive facilities master plan that directly relates to district-wide objectives.

As of this writing, there are no national educational adequacy standards in place and a little less than half of the states in the U.S. have developed state-level educational adequacy standards designed to assess the degree to which school facilities can adequately support the instructional mission and methods of a school or school district.

### **Why does ODE want to develop the Educational Adequacy Component to Long-Range Planning?**

ODE's Office of School Facilities works with architecture and engineering firms that serve school districts throughout Oregon to assess their facility needs and develop capital improvement plans. Under ODE's Technical Assistance Program (TAP), the program administers a Certified Assessor Training which is designed to help architects and engineers that are already working with schools to understand the reporting requirements for both the Office of School Facilities' Technical Assistance Program (TAP) and the Oregon School Capital Improvement Matching (OSCIM) Program. These programs require districts to conduct a Facilities Assessment and Long-Range Facility Plan that meets the requirements found in administrative rule. The goal of the Certified Assessor Training is to provide high-quality facility assessments and long-range facility plans to districts across the state that ensure districts meet the TAP requirements and can apply for OSCIM Program funding.

In the absence of national standards, one requirement of the long-range facility plans is for there to be an analysis of the District's current facilities' ability to meet District-adopted educational adequacy standards. Since the launch of TAP and OSCIM, the Office of School Facilities has seen the quality and depth of this analysis vary greatly. Many architectural and engineering companies have developed their own standards and they work with districts on selecting applicable standards that they then use for analysis and to direct community discussions around the educational vision for local schools and what improvements to facilities are needed to achieve that vision. However, other certified assessors do not provide this level of depth in their educational adequacy review. The concern is that districts and their communities are not seeing the full picture. This could result in misplaced priorities for limited facility improvement funds, and surprise costs during construction because not all information was available.

The goal of the Technical Assistance Program is to ensure that districts have the best and most complete information possible. By including a defined educational adequacy portion of the long-range facility planning process, ODE can meet that goal. These review standards will not take the place of more robust standards already being used by some Certified Assessors.

Ideally, every long-range facility plan should include an analysis based on educational adequacy standards that reflect the school district's educational goals and objectives. The minimum that will help districts will be a review of key facets of a facility that directly impact student achievement. Requiring districts, communities, and certified assessors to review school facilities on these key facets provide more information to lead to better decisions when planning for future capital improvements. It will also lead to facilities better able to keep students healthy, safe, and warm and can improve their learning outcomes.

Many certified assessors have provided additional value to districts and communities across the state with their robust educational adequacy review as part of the long-range facility planning process. ODE encourages districts to include these as part of the long-range facility process. Examples of educational adequacy standards used by Certified Assessors are as follows:

1. **Capacity:** Needs of the student population
2. **Support for Programs:** Spaces for specific curriculum offerings such as STEAM
3. **Technology:** Level of infrastructure
4. **Supervision and Security:** Physical configurations that help or hinder
5. **Instructional Aides:** Necessary equipment and storage
6. **Physical Characteristics:** Size and space conducive to various teaching styles
7. **Learning Environment:** Lighting, air quality, temperature, and acoustics
8. **Relationship of Spaces:** Proximity to libraries, restrooms, cafeteria/gym

However, ODE recognizes that not all educational adequacy categories are needed for each district. To require all of the categories, as shown above, would make the long-range facility planning process unwieldy and unusable for districts across Oregon. To provide flexibility while increasing the information available to districts, ODE wants Certified Assessors to take into account five primary facets of school facilities that directly correlate to student outcomes. Therefore, ODE's educational adequacy review standards will only focus on the following elements:

1. Acoustics and Noise
2. Air Quality
3. Lighting
4. Temperature
5. School Capacity and Classroom Space

ODE has two reasons for choosing these five categories to be required of all long-range facility plans. First, they are research-based and apply to those physical elements that affect student performance. Second, they can be effectively used by every district for every building used for instruction. The educational adequacy review standards are designed to focus on indoor

environmental quality since research has shown this to have a profound effect on both students' and teachers' comfort and cognitive performance.

These educational adequacy review standards are not building codes or requirements districts must meet. Instead, they are a tool to be used by districts and Certified Assessors to determine which improvements to the physical learning environment have the potential to positively impact student outcomes and achievement. To ensure that these standards are accessible to community members, district personnel, as well as professional architects, and other experts, ODE proposes using questions that are qualitative but will help districts prioritize capital renovation and construction projects at the most fundamental level of improving the physical learning environment.

## Acoustics and Noise

Noise levels greatly affect teacher and student performance. Excessive noise causes dissatisfaction and stress in both teachers *and* students. Research has found that schools that have classrooms with less external noise are positively associated with greater student engagement and achievement compared to schools with classrooms that have noisier environments.<sup>1</sup>

High levels of noise can cause irritation, encourage aggressiveness, reduce physical and mental performance, and cause discomfort and headaches. Furthermore, students with learning difficulties are particularly dependent on a good acoustic environment.<sup>2</sup>

Studies have documented the harmful effects of noise on children's learning. Children are much more impaired than adults by noise in tasks involving speech perception and listening comprehension. Non-auditory tasks such as short-term memory, reading, and writing are also impaired by noise. Evidence also shows that noisy classrooms require teachers to speak at vocal levels that cause stress and fatigue to their voices. Many teachers complain of tired voices, vocal strain, and health concerns because of their need to speak at such high vocal levels.<sup>3</sup>

Building schools that buffer external noise from classrooms or installing upgrades to optimize the acoustic environment can improve student outcomes. For districts or assessors looking for quantitative measures for determining the acoustical environment in a classroom, please refer to the Acoustical Society of America's resources and standards. However, ODE believes that the

---

<sup>1</sup> Klatte M, Bergström K and Lachmann T (2013) *Does noise affect learning? A short review on noise effects on cognitive performance in children*. *Front. Psychol.* 4:578. doi: 10.3389/fpsyg.2013.00578

<sup>2</sup> Winblad U., Dudley E. (1997). *Primary School Physical Environment and Health: WHO Global School Health Initiative*. Geneva: World Health Organization.

<sup>3</sup> Nelson, P., Soli, S., and Seltz, A. (2019). *Classroom Acoustics II: Acoustical Barriers to Learning*. <https://acousticalsociety.org/wp-content/uploads/2019/08/Classroom-Acoustics-II.pdf>

qualitative measures of the acoustic environment are beneficial for helping districts better understand the factors contributing to high noise levels in classrooms. This information can empower districts to improve acoustics through various means including adding sound control panels or ceiling tiles to lower the ambient noise or attend to HVAC issues such as ensuring that ducts are installed correctly.<sup>4</sup>

### **Acoustics – Educational Adequacy Review Standard<sup>5</sup>**

Acoustic conditions complement the educational function by good sound control in the classroom space, specifically:

- The sound-conditioning in a given space is acoustically comfortable to permit instructional activities to take place in the room.
- Sound is transmitted without interfering with adjoining instructional spaces.
- The ventilation system does not transmit an inordinate sound level to the instructional program.

***The acoustic conditions can be assessed by asking questions like the following:***

- Do students or teachers complain about noise in the classrooms?
- Do teachers or students report experiencing noticeable strain on their voices to teach or to communicate with others in the classroom?
- Do teachers express concern with regards to discipline in the classroom and/or students having difficulty following directions due to not hearing the teacher's instructions?
- If yes to any of the above, do teachers or students indicate a cause or source for the excessive noise? For example, does excessive noise intrude from outdoors or from an HVAC system, adjacent classrooms, or the corridor?
- Does the voice amplification system, if present, help or hinder the classroom acoustics?

---

<sup>4</sup> Rosone, Michael (2016). *5 Ways to Reduce HVAC Noise in an Open Office Space*. Arista Air Conditioning Corp. Retrieved from: <https://aristair.com/blog/5-ways-to-reduce-hvac-noise-in-an-open-office-space/>

<sup>5</sup> California Department of Education. Title 5, California Code of Regulations. Article 4(m). <https://www.cde.ca.gov/ls/fa/sf/title5regs.asp>



## Air Quality

Indoor Air Quality (IAQ) is one component of a school's physical environment and is often the most easily overlooked. High levels of CO<sub>2</sub> in the air can reduce the amount of oxygen available in the room. If a classroom has too much CO<sub>2</sub>, students may find it hard to pay attention to their teacher, concentrate on tests, or even stay awake. In one study, scientists found that high levels of CO<sub>2</sub> can even impair students' decision-making ability.<sup>6</sup> Too much CO<sub>2</sub> can also impact students' physical well-being causing headaches, dizziness, fatigue, even nausea, and worsening asthma symptoms.

The average outdoor atmospheric level of CO<sub>2</sub> is around 400 ppm (ppm = parts per million).<sup>7</sup> Students' ability to focus or stay awake can be affected when CO<sub>2</sub> levels in an indoor classroom environment reach 1,000 to 2,000 ppm. Headaches and other physical effects described above can begin at between 2,000 and 5,000 ppm.<sup>8</sup>

The solution to high CO<sub>2</sub> levels is better ventilation and ensuring that a school's HVAC system is operating efficiently. Periodic ventilation system testing and/or continuous CO<sub>2</sub> monitoring are also recommended.<sup>9</sup> Improved ventilation in turn offers other benefits to the health of both students and teachers by helping to lower radon levels in classrooms and is recommended for reducing the risk of the airborne transmission of viruses.

Ideally, if an analysis of CO<sub>2</sub> levels is performed, it should be done in consultation with a Mechanical, Electrical, and Plumbing (MEP) consultant.

Since Indoor Air Quality is already a component of ODE's Facilities Assessment, we recommend that the questions found on that worksheet be reviewed with the district first to determine how the school rates regarding this standard.

It is vitally important for the community and laypeople to be aware of the implications that indoor air quality has on learning, particularly concerning high CO<sub>2</sub> levels. If it is feasible to get a CO<sub>2</sub> measurement in classrooms, CO<sub>2</sub> levels above 1,000 ppm for all K-12 grades should be noted and explored concerning causes.

---

<sup>6</sup> Satish, U., Mendell, M., Krishnamurthy, S., Hotchi, T., Sullivan, D., Streufert, S., and Fisk, W. (2012). *Is CO<sub>2</sub> an Indoor Pollutant? Direct Effects of Low-to-Moderate CO<sub>2</sub> Concentrations on Human Decision-Making Performance*. *Environmental Health Perspectives*. 120:1671–1677. <http://dx.doi.org/10.1289/ehp.1104789>

<sup>7</sup> Lindsey, Rebecca. (2020). *Climate Change: Atmospheric Carbon Dioxide*. ClimateWatch Magazine. NOAA Climate.gov.

<sup>8</sup> Wisconsin Department of Health Services. (2019). *Carbon Dioxide*. Retrieved from: <https://www.dhs.wisconsin.gov/chemical/carbondioxide.htm>

<sup>9</sup> Chan, W., Li, X., Singer, B. Pistoichini, T., Vernon, D., Outcault, S., Sanguinetti, A., Modera, M. (2020). *Ventilation rates in California classrooms: Why many recent HVAC retrofits are not delivering sufficient ventilation*. *Building and Environment*. <https://doi.org/10.1016/j.buildenv.2019.106426>

## Air Quality – Educational Adequacy Review Standard

Classrooms provide adequate ventilation and air filtration, specifically:

- The school and/or district implement an Indoor Air Quality Management Program.

*The indoor air quality conditions can be assessed by asking questions like the following:*

- Do teachers or students report noticing the air quality in classrooms? How do they describe it? Is it hot, stuffy, dry, or humid?
- Have teachers observed themselves or students regularly experience sleepiness or a headache while in the classroom?
- Can windows be opened as needed?
- Do teachers ever open windows?
- Do teachers or students have complaints about the air coming into the classroom via HVAC vents?
- Do teachers and students report that the classroom air seems fresh and odor-free?

## Lighting

Lighting is a dominant factor in the brain's ability to focus. Studies show that learners in brightly lit environments got higher grades than those in dimly lit classrooms as poor lighting reduces the effectiveness of the brain's power to gather data. Full-spectrum lighting (like natural light) works best to improve behavior, create less anxiety and stress, and improve overall health. In one study, daylighting was found to have a considerable effect in the schools studied where students with the most exposure to natural daylight progressed 20% faster in math and 26% faster in reading than students who were taught in environments with the least amount of natural light. Daylighting is an efficient method for providing better learning conditions and health in schools.<sup>10</sup>

Studies also show that overhead cool-white fluorescent lighting ricochets off of many surfaces such as a classroom assignment on paper into the eyes. This reflection causes a type of unintended glare called veiling reflection. This interferes with students' ability to read words on paper and the whiteboard, which in turn harms academic performance.

If daylighting in the classroom setting is not an option, several studies have found that LED lights can be tuned to imitate natural light, which can still benefit students by improving

---

<sup>10</sup> Heschong Mahone Group. (1999). *Daylighting in Schools: Investigation into the Relationship between Daylighting and Human Performance*.

concentration and mood. Other researchers have found that LED lights can boost cognitive skills and lower students' rates of error.<sup>11</sup>

Although swapping out windows or installing skylights in an old school building may not be an approach that all districts can accommodate, it can be a consideration for schools that utilize portables where skylights may be installed more easily. Schools that want to maximize natural light in classrooms may want to consider a daylighting strategy. This is particularly relevant for the construction of new school facilities. Alternately, schools can look to replace light fixtures with energy-efficient full spectrum LED lighting that equips classrooms with lighting controls that adjust the color temperature to certain times of day or activities.<sup>12</sup>

### **Lighting – Educational Adequacy Review Standard<sup>13</sup>**

Light design generates an illumination level that provides comfortable and adequate visual conditions in each educational space, specifically:

- Ceilings and walls are white or light-colored for high reflectance unless the function of space dictates otherwise.
- Lights do not produce glare or block the line of sight.
- Window treatment allows entrance of daylight but does not cause excessive glare or heat gain.
- Fixtures provide an even light distribution throughout the learning area.

***The lighting conditions can be assessed by asking questions like the following:***

- Do students or teachers complain of glare coming from the lights or windows?
- Do teachers report not turning on the lights due to fluorescent lighting sensitivity or negative effects associated with the lighting such as headaches or eye strain?

---

<sup>11</sup> Barkmann, Claus & Wessolowski, Nino & Schulte-Markwort, Michael. (2012). *Applicability and efficacy of variable light in schools*. *Physiology & behavior*. 105. 621-7. 10.1016/j.physbeh.2011.09.020.

<sup>12</sup> Morrow, Brenda & Kanakri, Shireen. (2018). *The Effect of LED and Fluorescent Lighting on Children in the Classroom*.

<sup>13</sup> California Department of Education. *Title 5, California Code of Regulations*. Article 4(l). <https://www.cde.ca.gov/ls/fa/sf/title5regs.asp>

## Temperature

One consistent research finding across individuals of all ages is that the temperature in which a person works affects engagement levels and overall productivity—including student achievement. Anyone that has worked in a classroom or office that is too hot or too cold knows how difficult it can be trying to work when the temperature is uncomfortable. According to the best analyses, the ideal temperature range for effective learning in reading and mathematics is between 68 degrees and 74 degrees Fahrenheit.<sup>14</sup>

An analysis published by the National Bureau of Economic Research<sup>15</sup> comparing student test scores with average temperatures suggests that when classrooms get too hot it prevents students from learning as well as they would in more comfortable temperatures, with lasting impacts on students' future success and their ability to contribute economically. It also found that adequate investment in school infrastructure – namely air conditioning – can mitigate the negative effects of hot weather. Researchers calculated that on average, a school year that was hotter by 1 degree Fahrenheit correlated to a loss of 1 percent of a year's learning.

Moreover, the effect was as much as three times more damaging for black or Hispanic students compared to white students. Researchers accounted for the disparity by noting that white students are significantly more likely to live in cooler climates and attend schools with air conditioning in most or all of their classrooms. In 2019, KATU News<sup>16</sup> and KOIN 6 News reported that some schools in Oregon, like many in the Portland Public Schools district, don't have air conditioning.<sup>17</sup>

Humidity is also a factor in thermal comfort and indoor air quality. The US Environmental Protection Agency's "Indoor Air Quality: Tools for Schools" recommended that schools should keep indoor relative humidity levels between 30–50%, or at minimum, under 60% relative humidity to control mold, dust mites, and pests, and provide comfortable conditions for building occupants.<sup>18</sup>

At the very least, school facility managers should be able to control the temperature of small blocks of classrooms or zones within the building that receive the same amount of sunlight and have similar exposures to outside temperatures. The study by faculty at the Harvard Kennedy

---

<sup>14</sup> Perez, J., Montano, J., & Perez, J. (2014). *Does temperature impact student performance?* Retrieved from: <https://healthyschools.a4le.org/temperature.html>

<sup>15</sup> Goodman, Joshua, Michael Hurwitz, Jisung Park, and Jonathan Smith. (2018). *Heat and Learning*. HKS Faculty Research Working Paper Series RWP18-014, May 2018.

<sup>16</sup> English, Joe. (2019). *As summer heats up, students head back to school, some won't have air conditioning*. Retrieved from: <https://katu.com/news/local/as-summer-heats-up-students-head-back-to-school-some-wont-have-air-conditioning>

<sup>17</sup> Jones, Velena. (2019). *Teachers: PPS not keeping schools cool*. Retrieved from: <https://www.koin.com/news/education/teachers-pps-not-keeping-schools-cool/>

<sup>18</sup> United States Environmental Protection Agency. (2009). *Indoor Air Quality: Tools for Schools*. EPA 402/K-07/008

School implies that the benefits of school air conditioning likely outweigh the costs in most of the US. Given that Oregon is already experiencing the statewide impacts of a warming climate, installing air conditioning in schools is an important consideration for many districts planning for capital improvement.<sup>19</sup>

### Temperature – Educational Adequacy Review Standard

The school’s heating and cooling system provides consistent thermal comfort to students and teachers year-round.

***The temperature conditions can be assessed by asking questions like the following:***

- Are there times in the school year when the classrooms feel too warm or too cold?
- Are there other observations made by teachers or school administrators that would indicate that the classroom cannot maintain comfortable temperatures throughout the school year? For example, are students wearing outdoor jackets in the classroom during cold winter months or do students appear overheated in the late spring/early fall?
- Are school facility managers able to control the temperature of small blocks of classrooms or zones within the school building?

## School Capacity and Classroom Space

Overcrowded classrooms —and schools— have consistently been linked to decreased levels of student engagement and, therefore, decreased levels of learning. Available research shows that overcrowding causes a variety of problems and the findings indicate that students in overcrowded schools and classrooms do not score as high on achievement tests as students in non-overcrowded schools and classrooms. In a study of teachers working in urban schools, overcrowding resulted in a high rate of absenteeism among teachers and students. Teachers also reported that overcrowding resulted in stressful and unpleasant working conditions.<sup>20</sup>

Alternatively, classrooms with ample space are more conducive to providing appropriate learning environments for students and contribute to a positive learning environment. Classroom space is particularly relevant with the current emphasis on 21<sup>st</sup>-century learning such as ensuring students can work in teams, problem-solve, and communicate effectively. Classrooms with adequate space to reconfigure seating arrangements facilitate the use of different teaching methods that are aligned to 21<sup>st</sup>-century skills. Creating private study areas

---

<sup>19</sup> Oregon Climate Change Research Institute. (2019). *Forth Oregon Climate Assessment Report: State of climate science*. Retrieved from: <http://www.occri.net/ocar4>

<sup>20</sup> Corcoran, Thomas B.; Walker, Lisa J.; White, J. Lynne. (1988). *Working in urban schools*. Washington, DC: Institute for Educational Leadership.

as well as smaller learning centers reduces visual and auditory interruptions, and contributes to student development and achievement.

Because the issue of space is complex, to develop an educational adequacy standard that can be used broadly, ODE has elected to identify a review standard that is based on planned school capacity. However, some Certified Assessors will also look at the number of teaching stations throughout a school building and the average classroom utilization rate which is also a useful measure. Combined with capacity, these measures provide districts with a more comprehensive analysis of classroom space as it relates to the individual student.

### **School Capacity & Classroom Space – Educational Adequacy Review Standard**

The school can support its projected enrollment and the student population is within the limits of the school's capacity based on the district's classroom loading standards.

***The school capacity and classroom space can be assessed by asking questions like the following:***

- Do teachers and administrators see space in the classroom as an issue?
- Does the school have an adequate number of PE teaching stations to meet the P.E. activity requirements of [ORS 329.496](#)?
  - *For the 2021-2022 school year, students shall participate in physical education for at least 180 minutes during each school week. For the 2022-2023 school year and every school year thereafter, shall participate in physical education for at least 225 minutes during each school week.*
- At the high school level, are there adequate spaces to meet PE and athletic needs (e.g. do the conditions of courts and/or fields prevent the school from hosting athletic games and tournaments)? Are there Title IX issues that should be addressed?
- Is the size of core areas of the school sufficient to support student enrollment (e.g. cafeterias, gyms, and libraries).

# Applying Educational Adequacy Review Standards

The educational adequacy review standards are designed to foster a better understanding among district leadership, facility planners, and the local community involved in long-term capital improvement planning of specific aspects of school buildings that have been shown to directly affect student performance and outcomes. Also, these review standards account for factors in the physical learning environment that may not be readily apparent to the naked eye and are typically not well understood by the public. These factors studied over the past several decades have been shown to have statistical significance regarding their impact on students and teachers who work in the indoor classroom setting for several hours a day.

These qualitative measures were also selected due to their accessibility and do not require equipment to measure or observe.

ODE requires districts and Certified Assessors to use these Educational Adequacy Review Standards as a starting point to determine to what degree instructional spaces at each school campus provide for students’ and teachers’ most basic needs. The purpose of this is for districts and Certified Assessors to then establish the cost associated with upgrading facilities to improve the conditions of the indoor learning environment. With this information, district leadership, Certified Assessors, and community members will be better positioned to ascertain which of these facets for healthy learning environments need to be prioritized as part of districts’ long-range facility planning.

<b>1. ACOUSTICS</b>				
Acoustic conditions complement the educational function by good sound control in the classroom space, specifically: <ul style="list-style-type: none"> <li>• The sound-conditioning in a given space is acoustically comfortable to permit instructional activities to take place in the room.</li> <li>• Sound is transmitted without interfering with adjoining instructional spaces.</li> <li>• The ventilation system does not transmit an inordinate sound level to the instructional program.</li> </ul>				
<i>Poor</i>	<i>Fair</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Excellent</i>
<b><u>Comments:</u></b>				

## 2. AIR QUALITY

Classrooms provide adequate ventilation and air filtration, specifically:

- The school and/or district implement an Indoor Air Quality Management Program.

<i>Poor</i>	<i>Fair</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Excellent</i>
<b><u>Comments:</u></b>				

## 3. LIGHTING

Light design generates an illumination level that provides comfortable and adequate visual conditions in each educational space, specifically:

- Ceilings and walls are white or light-colored for high reflectance unless the function of space dictates otherwise.
- Lights do not produce glare or block the line of sight.
- Window treatment allows entrance of daylight but does not cause excessive glare or heat gain.
- Fixtures provide an even light distribution throughout the learning area.

<i>Poor</i>	<i>Fair</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Excellent</i>
<b><u>Comments:</u></b>				

## 4. TEMPERATURE

The school's heating and cooling system provides consistent thermal comfort to students and teachers year-round.

<i>Poor</i>	<i>Fair</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Excellent</i>
<b><u>Comments:</u></b>				

## 5. SCHOOL CAPACITY & CLASSROOM SPACE

The school can support its projected enrollment and the student population is within the limits of the school's capacity based on the district's classroom loading standards.

<i>Poor</i>	<i>Fair</i>	<i>Satisfactory</i>	<i>Good</i>	<i>Excellent</i>
<b><u>Comments:</u></b>				



## Additional Resources for Quantitative Measures & Standards

For districts and Certified Assessors wanting quantitative measures for classroom acoustics, air quality, lighting, temperature, classroom space, and school capacity, please refer to the following standards and indicators, many of which are approved by the American National Standards Institute (ANSI). These standards and indicators are not required by ODE but are provided to districts and professionals working with schools as additional, well-established guidelines for new and significantly renovated school facilities.

### Acoustics

The Acoustical Society of America recommends that noise levels in core learning spaces should not exceed 35 dBA (A-weighted decibels) throughout each unoccupied classroom. The classroom acoustics standard ANSI/ASA S12.60 also specifies that reverberation times do not exceed 0.6 seconds in an unoccupied classroom and primary learning spaces be readily adaptable to reverberation times as short as 0.3 seconds. Please refer to the following:

**ANSI/ASA S12.60 PART 1** – American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools

**ANSI/ASA S12.60 PART 2** – American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 2: Relocatable Classroom Factors

### Air Quality

With regards to CO<sub>2</sub> concentration in the classroom, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends 700 parts per million (ppm) above the outdoor concentration as the upper limit for occupied classrooms (usually around 1,000 ppm). Please refer to ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality.

### Lighting

The Illuminating Engineering Society (IES) recommends an illuminance of 30 to 50 footcandles for a typical classroom. Please refer to ANSI/IES RP-3-20, American National Standard Practice on Lighting for Educational Facilities.

### Temperature

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends for thermal comfort purposes, temperature could range between approximately 67 and 82 °F. Please refer to ANSI/ASHRAE 55-2020, Thermal Environmental Conditions for Human Occupancy. The EPA's Reference Guide for Indoor Air Quality in Schools summarized the ASHRAE standard in the table below to show the temperature and humidity ranges that are comfortable for 80 percent of people engaged in largely sedentary activities.

## Recommended Ranges of Temperature and Relative Humidity<sup>21</sup>

Relative Humidity	Winter Temperature	Summer Temperature
30%	68.5°F - 75.5°F	74.0°F - 80.0°F
40%	68.0°F - 75.0°F	73.5°F - 80.0°F
50%	68.0°F - 74.5°F	73.0°F - 79.0°F
60%	67.5°F - 74.0°F	73.0°F - 78.5°F

*Recommendations apply for persons clothed in either typical summer or winter clothing while performing a mainly sedentary activity. Source: Adopted from ASHRAE Standard 55-1992, Thermal Environmental Conditions for Human Occupancy.*

## School Capacity and Classroom Space

When determining the capacity of a school, a typical approach is:

1. Count the number of teaching stations in the building. A teaching station is a room or space that is occupied by students for instructional purposes most of the school day.
2. Determine the class size goal for each grade (or program). Determine the average utilization rate of each teaching station. This may be 100% for elementary schools, but will typically be 75-85% for middle and high schools (providing one period per day when the room will be vacant to allow for teacher prep).
3. Assess whether the size of core areas is sufficient to support student enrollment (e.g. cafeterias, gyms, and libraries).

To provide meaningful information related to building capacity and classroom space for existing school facilities, Certified Assessors and school districts need to utilize several indicators with related data points to assess whether objectives are being met. There are no nationally approved standards for classroom space, however, the National Center for Education Statistics (NCES) suggests the following objectives and example indicators for determining whether the school's campus provides sufficient space for enrollment and community use:

---

<sup>21</sup> <https://www.epa.gov/iaq-schools/reference-guide-indoor-air-quality-schools>

Objectives	Example of Indicators
There is sufficient space for the current enrollment.	<ul style="list-style-type: none"> <li>• Current classroom space meets the district’s class size targets.</li> <li>• All students are housed in permanent structures.</li> <li>• The instructional space per student meets standards.</li> <li>• No students are housed in a substandard space.</li> </ul>
There is sufficient space for projected enrollments.	<ul style="list-style-type: none"> <li>• The school can support its projected enrollment.</li> <li>• The school can support the expansion of early childhood education.</li> </ul>
Schools are utilized after normal school hours by the community.	<ul style="list-style-type: none"> <li>• Appropriate areas of the school are made available for community use after normal school hours.</li> <li>• The school district informs the community about facility availability and encourages community use.</li> </ul>
<p><i>Source: National Forum on Education Statistics. (2018). Forum Guide to Facility Information Management: A Resource for State and Local Education Agencies. (NFES 2018-156). U.S. Department of Education. Washington, DC: National Center for Education Statistics.</i></p>	