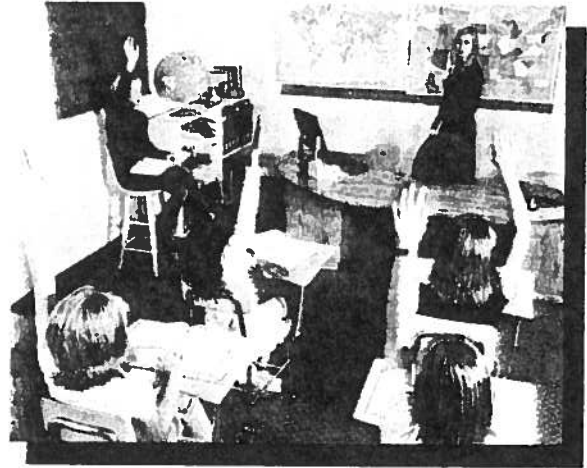



Rural School District Enrollment and Building Capacity

Projections for the Next 10 Years



The Center for 
Rural Pennsylvania
A Legislative Agency of the Pennsylvania General Assembly

Rural School District Enrollment and Building Capacity *Projections for the Next 10 Years*

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Executive Summary

Given the shifting population trends across the U.S. and Pennsylvania, it is important for policy makers and school districts to know what to expect, in terms of school district enrollment and facility needs, in the coming years.

This research was conducted to provide a perspective on the potential building needs of school districts over the next 10 years. The researcher developed an inventory of school buildings in rural Pennsylvania through a survey of rural school districts, analyzed enrollment trends for rural school districts over the next 10 years, developed a

statistical model to examine future building needs, and determined whether school districts will be at risk of under- or over-capacity.

The findings provide a complex portrait of Pennsylvania's current rural school building conditions and projections of building use over the next 10 years. For example, while the majority of rural school district respondents reported that their school building conditions were satisfactory, a sizable minority reported their building conditions as unsatisfactory.

The research revealed that the average age of Pennsylvania rural school buildings is older than the national average age of rural schools. Fifteen percent of rural schools in the survey had a functional age of 35 years or more. Many aging rural schools have experienced problems with energy efficiency and other environmental conditions that interfere with classroom learning. None of the respondents with schools having a functional age of 35 years or more reported having excellent environmental conditions. More than 80 percent of those respondents reported their building energy efficiency conditions to be poor or borderline. About half reported handicapped accessibility and vehicular entrances and exits as unsatisfactory.

Over the next 10 years, rural Pennsylvania school enrollment is projected to decrease 8 percent. The most significant enrollment decline is projected to be in western Pennsylvania, where rural school districts may have a 16 percent decline. More than 40 percent of elementary schools and more than 60 percent of secondary schools in western Pennsylvania are projected to

experience significant enrollment decreases (15 percent or greater).

More than half of rural schools are projected to experience severe under-enrollment over the next 10 years, with more than 25 percent below capacity. The proportion of rural schools experiencing under-enrollment will differ somewhat by geographic region. Elementary and secondary schools in western and central Pennsylvania are more likely to be under-enrolled than those in the east. About 70 percent of elementary schools in the west and more than 50 percent of elementary schools in the central region will be under-enrolled. About 90 percent of secondary schools in the west and more than 80 percent of secondary schools in the central region are more likely to be under-enrolled. On the other hand, about 10 percent of elementary and secondary schools in the east are more likely to be over-crowded.

The research also looked at telecommunications readiness and compared rural schools and urban schools in terms of Internet access, computer Internet connectivity speed and computer processor capacity, and technology equipment in classrooms and other spaces.

The research found that more than 67 percent of rural school classrooms had wired Internet access, about 2 percent had wireless access and about 30 percent had both.

In general, urban schools tended to have more computers with high speed connectivity-high capacity processors in classrooms and library/media centers than rural schools.

There was no significant difference between urban and rural schools in technology equipment, except for the higher number of printers in urban school classrooms than in rural school classrooms.

Based on the findings, the researcher recommends the following policy considerations:

- The Pennsylvania Department of Education (PDE) and school districts should consider establishing a reporting system to effectively monitor school building conditions.
- School districts should consider ways to use under-used school buildings and maximize public use of school facilities.
- PDE and school districts should consider the changing face of student learning environments to accurately assess building capacity needs.

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Introduction

School districts administrators across Pennsylvania are taking note of the shifting population trends occurring across the state and within their districts.

The Center for Rural Pennsylvania's 2005 analysis of the Pennsylvania Department of Education's (PDE) school enrollment projections showed a mixed picture for rural districts. For example, between 2005 and 2014, 115 rural school districts are projected to have a significant decline in enrollment (15 percent or greater), while 10 rural school districts are projected to have a significant increase in enrollment (15 percent or greater).

Statistical models and surveys currently available in other states do not match the needs of Pennsylvania's rural districts (Hsley, 2002; Neblock, 1996; Peters, 1997). PDE currently gathers related data in the following areas: enrollment projections by district through 2016 (generated in 2007) and enrollment trends from 1998 to the present. However, building needs, technology readiness, and handicap accessibility projections are not part of the state's data collection.

For school districts to prepare for shifting enrollments and the future needs of their students, they need to understand the current condition of their school buildings and understand the population trends in their districts.

To provide rural Pennsylvania school districts with some baseline information on school buildings and population trends, the researcher conducted an inventory in 2006-2007 of the state's rural school buildings, including their age, physical condition, telecommunications readiness, and other relevant indicators related to the cost of maintaining, upgrading, or replacing facilities.

The researcher also analyzed enrollment trends to identify whether school buildings in rural school districts will meet future needs over the next 10 years and identified school districts, by region, that, over the course of the next 10 years, will be at risk of under- or over-capacity. Currently, this information is unavailable through national or state data sources.

Methodology

To conduct the study, the researcher used multiple data sources including the following: a statewide survey on rural school building conditions, and PDE's 10-year enrollment data, its Pennsylvania Technology Inventory (PATI) and its Plancon data.

Survey Instrument

The researcher developed a survey, which was sent to all 243 rural Pennsylvania school districts¹. Superintendents or other district-level personnel, such as business managers or supervisors of special projects, completed the surveys. A total of 65 school districts returned the surveys via email, fax or regular mail, for a response rate of 27 percent.

The survey instrument was divided into three sections: Characteristics of Rural School Districts, Inventory of Existing School Building Conditions, and Projections.

The "Characteristics of School Districts" section collected information on the characteristics of individual buildings in rural school districts, such as school names, the number of buildings, the location of buildings, grade levels included in each building, and student enrollment in each building.

The "Inventory of Existing Conditions" section obtained information on the physical condition and capacities of each building within the school district, such as building age, which included any renovation projects, and physical condition, which included environmental factors, building features, building safety features, building accessibility, and building energy efficiency.

The "Projections" section collected information on any anticipated changes in the areas of language arts, mathematics, and special education over the next 10 years.

PDE Data

In addition to the survey constructed for this project, the researcher used the following existing data from PDE:

- Ten-Year Enrollment Projections (2006-2016) – The researcher used the data to analyze the prediction of enrollment change in the next 5 years (2006-2007 to 2011-2012) and next 10 years (2006-2007 to 2016-2017), at both the elementary and secondary levels.
- The Pennsylvania Technology Inventory (PATI) – These data provide detailed information regarding computer availability and connectivity (including Internet access, computer Internet connectivity speed and processor capacity, and technology equipment in classrooms, labs, libraries and offices) for every school district in the state.
- PlanCon Data – School districts seeking reimbursement for any renovation or construction projects must provide detailed information on their school building capacity. The PlanCon data also provide a standard unit for calculating building capacities. Even though

¹ According to the Center for Rural Pennsylvania, a school district is rural when the number of persons per square mile within the school district is less than 274. School districts that have 274 persons or more per square mile are considered urban.

PlanCon data were only available for the school districts that seek reimbursement for their renovation or construction projects through PDE, they provided information for validating the data that were collected from the survey. They also provided school capacity information for those school districts that were not included in the survey. By combining the PlanCon data and the survey data, the researcher was able to analyze the building capacity for 126 school districts. These school districts represented 52 percent of the rural school districts in Pennsylvania.

The school building capacity data were also combined with enrollment projections to create a school capacity and enrollment dataset. By comparing school enrollment projections to school capacity, the researcher could project under- and over-enrollment among rural districts by geographic regions.

Reliability of the Data Source

Two important indicators of school characteristics - namely the percentage of low-income students and region - were used throughout the comparisons of this study. Prior literature indicated that school enrollment projections and school building conditions were significantly related to these two factors (NCES, 2000, 2002, 2005; The Center for Rural Pennsylvania, 2005).

This research used PDE data on the percentage of low-income students. PDE uses the following measures to determine the percentage of low-income students: poverty data sources, such as Temporary Assistance for Needy Families, Medicaid and the number of children living in institutions for the neglected or delinquent or those supported in foster homes. To the extent that such data were not available, the most recent reliable data available at the time of determination, such as free and reduced school lunch eligibility, were used.

The research also employed data from the Center of Rural Pennsylvania to group rural Pennsylvania school

districts into eastern, central and western regions. By combining the percentage of low-income student data with the regional data, the researcher created the school characteristics data for rural school districts.

To assess the reliability of the data source, the researcher compared the characteristics of school districts that were included in analysis with those school districts that were not included. The researcher found no significant differences between these districts, confirming that the data sources used in this study are not biased on these key school characteristics (See Table 1).

Results

Building Conditions

Building Environmental Conditions

Environmental conditions, such as air quality, air filtration systems, local exhaust systems, heating systems, air conditioning and acoustics are important aspects of the day-to-day environment for student learning. While the majority of rural school officials reported that the environmental conditions in their schools were satisfactory (about 50 percent said satisfactory and 30 percent said excellent), a sizable minority reported their environmental conditions as unsatisfactory.

Acoustics were rated as unsatisfactory by more school officials than any other environmental condition. Approximately 20 percent indicated their schools' acoustics were unsatisfactory. About 17 percent of respondents reported the heating system was unsatisfactory. Fifteen percent were not satisfied with indoor air quality, about 13 percent were not satisfied with the air filtration system and local exhaust system and 7 percent were not satisfied with the air conditioning.

The respondents' satisfaction ratings with environmental conditions show some variation by school characteristics. For example, respondents from secondary schools were less satisfied with the local exhaust system than

those from elementary schools. Respondents in the central Pennsylvania region were less satisfied with the local exhaust system than respondents in the western and eastern regions. Respondents in the west were less likely to rate their schools' acoustics as unsatisfactory than respondents in the central and eastern regions. Respondents with higher concentrations of low-income students were less likely to report their schools' air filtration system, local exhaust system and heating system as unsatisfactory than those with a lower concentration of low-income students.

Table 1: Percentage of Rural School Districts Included/Not Included in Study by School Characteristics

School Characteristics	School Districts	
	Not Included in Study (n= 117)	Included in Study (n= 126)
Region		
West	51 (44%)	56 (44%)
Central	42 (36%)	47 (37%)
East	24 (21%)	23 (18%)
Percentage of Low-income Students		
Less than 20 percent	19 (16%)	21 (17%)
20 to 29 percent	30 (26%)	31 (27%)
30 to 39 percent	12 (10%)	38 (30%)
40 and above	26 (22%)	33 (26%)

Note: Percentages are computed across each column, but may not sum to 100 because of rounding. Data Source: The Center for Rural Pennsylvania. Survey on Rural School Building Condition, 2007

Condition of Major Building Features

The survey collected information about the respondents' satisfaction with four major school building features: roof; foundation; drywall, plaster and bricks; and exterior and interior walls. The majority of rural school respondents reported that the school foundation, drywall, plaster and bricks, and exterior and interior walls were satisfactory (more than 50 percent said satisfactory and more than 23 percent said excellent). Roof conditions were rated lowest among the major building features as roughly 25 percent of respondents rated the roof as unsatisfactory.

Rural respondents' satisfaction ratings with the roof, foundation and walls did not vary significantly by school characteristics, such as instructional level, region and percentage of low-income students. However, the respondents' satisfaction ratings with drywall, plaster and bricks show some variation by region and the percentage of low-income students. For example, respondents in the western and central areas were less satisfied with their schools' drywall, plaster and bricks than those in the east. Respondents from more affluent schools were more satisfied with the drywall, plaster and bricks than those from less wealthy schools.

Condition of Minor Building Features

The survey collected information about the respondents' satisfaction with four minor rural school building features: interior water supply; exterior water supply; lockers; and restrooms.

More than 90 percent of respondents reported that the interior/exterior water supply and lockers were satisfactory (more than 50 percent satisfactory and more than 40 percent excellent). Approximately 89 percent said the restrooms were satisfactory or excellent.

Rural school respondents' satisfaction ratings with interior water supply and lockers did not vary significantly by school characteristics, such as instructional level, region and percent of low-income students.

However, satisfaction ratings with exterior water supply show some variation by the percentage of low-income students. Respondents with 40 percent or more low-income students were more likely to report that their schools' exterior water supply conditions were borderline than those from more wealthy schools.

Respondents' satisfaction ratings with restrooms show some variation by region and the percentage of low-income students. For example, respondents in the east were less likely to rate the restrooms as unsatisfactory than respondents in the west and central regions. Respondents from affluent schools (those with less than 20 percent low-income students) were more likely to report restrooms as unsatisfactory than those from less wealthy

schools (schools with higher concentrations of low-income students).

Condition of Building Safety

The survey collected information about respondents' satisfaction with building safety in terms of fire alarms, smoke detectors and sprinkler systems, light sources, and emergency lighting.

About 97 percent of respondents reported that the fire alarms, smoke detectors and sprinkler systems were satisfactory (36 percent satisfactory and 62 percent excellent). About 88 percent said the light sources in their schools were satisfactory (51 percent satisfactory and 37 percent excellent). Approximately 90 percent said the emergency lighting in their schools was satisfactory (59 percent satisfactory and 31 percent excellent).

Respondents' satisfaction ratings with building safety did not vary significantly by school characteristics, such as instructional level, region and percentage of low-income students.

Condition of Building Energy Efficiency

The survey gathered information on the respondents' satisfaction with energy efficiency in terms of fluorescent lighting, building envelopes (outer walls, insulation and siding), and building energy efficiency.

While more than 60 percent of respondents said the building energy efficiency was satisfactory, more than 30 percent said building energy efficiency was unsatisfactory.

Respondents' satisfaction rating with building energy efficiency did not show any variation by school instructional level and the percentage of low-income students. However, satisfaction ratings with building energy efficiency showed some variation by region as respondents from the east were more satisfied than respondents from the west and central regions.

Condition of Building Accessibility

The survey asked about the respondents' satisfaction with various building accessibility features including handicapped accessibility, vehicular entrances and exits, pedestrian services, student drop-off areas, and bus loading areas.

The majority of respondents reported the handicapped accessibility, vehicular entrances and exits, pedestrian services, and bus loading areas were satisfactory (more than 40 percent satisfactory and more than 30 percent excellent). Student drop-off areas were rated lowest (33 percent unsatisfactory).

Satisfaction with building accessibility did not show any variation by school characteristics, such as instructional level, region and concentration of low-income students.

Functional Age of School Building

Many rural schools have been renovated in the years since they were built. For this reason, the year of the most recent renovation is often a better basis of a school's age than the year of original construction. Therefore, to accurately determine the school building age, the study used functional age. For schools with no major renovations, the functional ages of the buildings were calculated as the years since they were built. For schools that completed major renovation projects, functional ages were identified as the number of years since the completion of such projects.

According to the survey results, the average age of rural Pennsylvania school buildings (44 years) is higher than the average age of rural schools nationwide (41 years). However, the average functional age of rural Pennsylvania schools, as defined above, was 16 years. Fifteen percent of rural Pennsylvania schools had a functional age of 35 years or more.

Rural schools' functional age did not show any variation by school characteristics with regards to region and percentage of low-income students. However, there was some variation in the functional age distributions by school instructional level. The average functional age of secondary schools was less than the average functional age of elementary schools (13 years versus 18 years, respectively).

The indicator of school condition used in this report is satisfaction with the school building conditions. The proportion of respondents that reported their satisfaction level with their building conditions differed by school ages, with older schools typically receiving worse satisfaction levels than newer schools. Respondents from schools with functional ages of 35 years or more, and those aged 15 to 34 years, were more likely to report their environmental factors (indoor air quality, air filtration system, local exhaust system, heating system, air conditioning and acoustics) as poor than those from newer schools (functional ages of less than 5 years, or 5 to 14 years). None of the respondents from schools aged 35 years or more reported their environmental factors as excellent. About 20 percent from schools with functional ages of 35 years or more reported their air filtration system and air conditioning as poor.

Respondents from schools with functional ages of 35 years or more, and those aged 15 to 34 years, were more likely to report their major building feature conditions (roof, foundation and walls) as unsatisfactory (poor or borderline) than were those from newer schools (functional ages of 14 years or less). More than 50 percent of respondents from schools with functional ages of 35 years or more rated their roof as poor or borderline.

Older schools typically have worse building safety

conditions and building energy efficiency features than newer schools. About 18 percent of respondents from schools with functional ages of 35 years or more reported the fire alarms, smoke detectors and sprinkler systems as poor, and about 23 percent reported the emergency lighting as borderline. More than 80 percent of respondents from schools with functional ages of 35 years or more and 48 percent of those from schools aged 15 to 34 years reported their building energy efficiency condition as poor or borderline.

Respondents from schools with functional ages of 35 years or more were more likely to report their building accessibility as poor or borderline than those from schools aged 34 or less. About 50 percent of respondents from schools with functional ages of 35 years or more reported their handicapped accessibility, and vehicular entrances and exits as unsatisfactory, and more than 70 percent reported their student drop-off area as poor or borderline.

Condition of Telecommunications Readiness

For this study, the researcher used the most recent PATI data (school year of 2007-2008) to identify differences of telecommunications readiness between urban and rural schools in terms of Internet access, computer Internet connectivity speed and processor capacity, and technology equipment in classrooms, labs, libraries and offices.

The researcher aggregated the data to the school district level and used the school district technology data to further examine the relationship between telecommunications conditions and school characteristics in rural school districts.

Internet Access in the Classroom

A summary of the comparison of classroom Internet access by rural and urban schools is presented in Table 2. More than 67 percent of rural school classrooms were equipped with wired Internet access, about 2 percent of

Table 2: Percentage of School Classrooms with Internet Access by Urban and Rural Schools

Percentage of Classrooms with:	Rural Schools	Urban Schools
Wired Internet Access	67%	66%
Wireless Internet Access	2%	2%
Both Wired and Wireless Access	30%	33%
No Internet Access	<1%	<1%

Note: F-test results indicated that there were no significant differences between urban and rural schools in classroom Internet access. Data Source: PDE PATI, 2007-2008.

classrooms had wireless Internet access, and 30 percent of classrooms had both wired and wireless access. There were no significant differences between urban and rural schools in classroom Internet access.

The condition of rural schools' Internet access did not significantly differ by school characteristics, such as concentration of low-income students and region, in most situations. However, rural schools in the east and central regions had more stationary computer labs equipped with wireless Internet access than schools in the west.

Computer Internet Connectivity Speed and Processor Capacity

Computer Internet connectivity speed and processor capacity are important aspects of technology conditions for student learning.

In general, urban schools had more computers with high speed connectivity-high capacity processors in classrooms and library/media centers than rural schools. Urban schools also had more computers in their stationary computer labs with high speed connectivity-low capacity processors than rural schools.

The number of computers located in mobile computer labs and administrative offices and their connectivity speed to the Internet and processor capacity did not significantly differ among urban and rural schools. Also, very few classrooms, computer labs, libraries and offices in urban and rural schools had computers still equipped with dial-up connectivity to the Internet.

The condition of computer Internet connectivity speed and processor capacity in classrooms was further examined by rural school characteristics. The number of computers located in classrooms, stationary computer labs, mobile computer labs, library/media centers and administrative offices, and their connectivity speed and

Table 3: Average Number of Technology Equipment Located Per Classroom by Urban and Rural Schools

Average Number of Technology Equipment per Classroom	Rural Schools	Urban Schools
Electronic Whiteboards	0.19	0.16
Data Projectors	0.31	0.33
Printers * (t = 2.37, p = .02)	0.66	0.73
Digital Cameras	0.09	0.08
Digital Video Cameras	0.03	0.04
Individual User Webcams	0.15	0.20

Note: * T-test results indicated no significant differences in the number of technology equipment in urban and rural schools, except that urban school classrooms have more printers than rural school classrooms. Data Source: PDE, PATI, 2007-2008.

processor capacity did not significantly differ by percentage of low-income students.

Internet connectivity speed and processor capacity in rural classrooms showed some variation by region, however. Classrooms in the east had more computers equipped with high speed connectivity to the Internet and computers equipped with low capacity processors than those in the western and central regions.

Technology Equipment

Technology equipment, such as electronic whiteboards, data projectors, printers, digital cameras, digital video cameras and webcams, is important for student learning.

According to the research, there was no significant difference between urban and rural schools in technology equipment, except for the higher number of printers located in urban school classrooms and mobile computer labs than in rural school classrooms and mobile computer labs (Table 3).

The results also indicate some variation in technology equipment in rural schools by school characteristics, such as concentration of low-income students and region. For example, more affluent rural schools (with less than 20 percent of low-income students) were more likely to have more digital cameras and digital video cameras in their classrooms, more electronic whiteboards in their stationary computer labs, and more digital video cameras in their library/media centers than those in less wealthy schools. Rural schools in the east had more data projectors with shared access than those in the western and central regions. Rural schools in the central region were more likely to have more printers with shared access than those in the western and eastern regions.

Prediction of Enrollment Change

Using the most recent enrollment projection data (from 2006 to 2016), the researcher examined enrollment changes for rural schools over the next 5 and 10 years. Similar analyses were conducted for elementary and secondary schools.

Enrollment Change for Rural Schools

Over the next 5 years (from 2006 to 2011), enrollment in rural schools is projected to decrease 6 percent. The most significant decline is projected to be in western Pennsylvania, where rural school districts may see an enrollment decline of about 10 percent. Schools in the central region are projected to have a 4 percent decline, and schools in the eastern region are projected to have an enrollment decline of about 2 percent (See Figure 1 on Page 10).

Over the next 10 years (from 2006 to 2016), rural school enrollment is projected to continue its decline.

Figure 1: Percent Change in Enrollment by Region Over the Next 5 Years

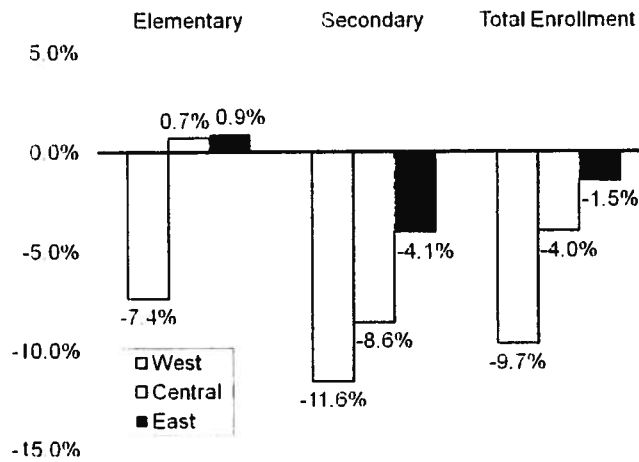
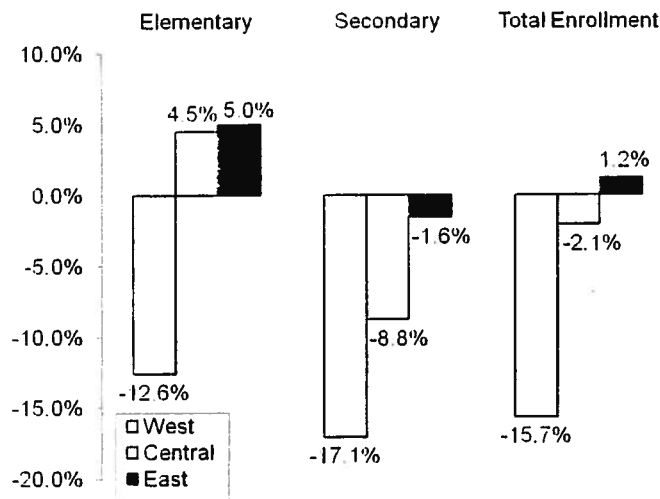


Figure 2: Percent Change in Enrollment by Region Over the Next 10 Years



Between 2006 and 2016, enrollment in rural schools is projected to decrease 8 percent. The most significant decline is projected to be in western Pennsylvania, where rural school districts may have an enrollment decline of about 16 percent. Elementary school enrollment in western Pennsylvania is projected to decline from about 7 percent in the next 5 years to about 13 percent in the next 10 years. The same pattern will occur in secondary schools in western Pennsylvania, where enrollment is projected to decline from about 12 percent in the next 5 years to about 17 percent in the next 10 years (See Figure 2).

On the other hand, rural districts in eastern Pennsylvania are projected to have an enrollment increase of about

1 percent. Elementary school enrollment in eastern Pennsylvania is projected to increase from about 1 percent over the next 5 years to 5 percent over the next 10 years. Secondary school enrollment in eastern Pennsylvania is projected to decrease at a slower rate, from about 4 percent over the next 5 years to about 2 percent over the next 10 years.

A similar pattern is projected to occur in central Pennsylvania, where total enrollment will decline slowly from 4 percent over the next 5 years to about 2 percent over the next 10 years. Elementary school enrollment in central Pennsylvania is projected to increase from about 1 percent over the next 5 years to about 5 percent over the next 10 years.

Enrollment Change in Elementary and Secondary Schools

Following a method used by the Center for Rural Pennsylvania, the researcher further grouped rural school districts into one of three categories: districts with significant projected increases in enrollment (15 percent or greater increase); districts with projected moderate changes in enrollment (14 percent decrease to 14 percent increase); and districts with significant projected decreases in enrollment (15 percent or greater).

The middle category, “moderate change in enrollment,” was intentionally made large to include districts that may have only marginal changes in enrollment.

About 30 percent of rural elementary schools are projected to experience significant enrollment decreases (15 percent or greater decrease), about 52 percent of elementary schools are projected to have moderate enrollment changes (14 percent decrease to 14 percent increase) and about 18 percent of elementary schools are projected to experience significant increases (15 percent or greater increase).

The proportion of rural elementary schools experiencing enrollment change over the next 10 years will differ somewhat by geographic region and percentage of low-income students in the schools. More than 40 percent of elementary schools in the west are projected to experience significant enrollment decreases, while more than 30 percent of elementary schools in the east and central region are projected to experience significant enrollment increases.

In addition, affluent elementary schools (those with less than 20 percent low-income students) are projected to be more likely to experience significant enrollment increases than less wealthy schools.

Over the next 10 years, about 48 percent of rural secondary schools are projected to experience significant

enrollment decreases (15 percent or greater decrease). The proportion of rural secondary schools experiencing enrollment changes over the next 10 years will differ somewhat by geographic region and percentage of low-income students.

More than 60 percent of secondary schools in the west are projected to experience significant enrollment decreases, while more than 20 percent of secondary schools in the east are projected to experience significant enrollment increases.

Affluent secondary schools (those with less than 20 percent low-income students) are projected to be more likely to experience significant enrollment increases than less wealthy schools.

Prediction of Enrollment Change for Total School Districts

About 35 percent of rural schools are projected to experience significant enrollment decreases (15 percent or greater decrease), about 59 percent are projected to have moderate enrollment changes (14 percent decrease to 14 percent increase), and approximately 6 percent are projected to experience significant increases (15 percent or greater increase).

The proportion of rural schools experiencing enrollment change over the next 10 years will differ somewhat by geographic region and percentage of low-income students. More than 60 percent of schools in the west are projected to experience significant enrollment decreases. More than 20 percent of schools in the east are projected to experience significant enrollment increases. Affluent schools (those with less than 20 percent low-income students) are projected to be more likely to experience significant enrollment increases than less wealthy schools.

Statistical Model for Identifying Future Building Capacity Needs

The researcher developed a statistical model to identify future building capacity needs for rural school districts by examining the degree to which school enrollments differed from the number of students the school is designed to accommodate (building capacity).

This analysis included four steps: determine the school building classification; calculate school capacity for elementary schools; calculate school capacity for secondary schools; and compare district enrollment to school capacity.

According to the analysis, the majority of rural schools (73 percent) are projected to experience severe under-enrollment, with enrollment more than 25 percent below their capacity over the next 10 years. Only about 2 percent of rural schools are projected to have enrollments

within 5 percent of their building capacity. Schools in the west and central region are projected to be more likely than those in the east to be severely under-enrolled, (88 percent and 66 percent versus 48 percent, respectively).

More than half of rural elementary schools (58 percent) are projected to experience severe under-enrollment over the next 10 years. The proportion of rural schools experiencing under-enrollment over the next 10 years will differ somewhat by geographic region. About 70 percent of elementary schools in the west and more than 50 percent of elementary schools in the central region are likely to be severely under-enrolled. However, about 10 percent of elementary schools in the east are more likely to be severely over-crowded (enrollments of more than 25 percent greater than their capacity).

A majority of rural secondary schools (82 percent) are projected to experience severe under-enrollment, with enrollment of more than 25 percent below building capacity. The proportion of secondary schools experiencing under-enrollment over the next 10 years will differ somewhat by geographic region. Approximately 90 percent of secondary schools in the west and more than 80 percent of secondary schools in the central region are more likely to be severely under-enrolled. On the other hand, approximately 10 percent of secondary schools in the east are more likely to be severely over-crowded (enrollments of more than 25 percent greater than their capacity).

However, the proportion of elementary and secondary schools experiencing under-enrollment or over-crowding over the next 10 years will not differ by the percentage of low-income students in the school.

Conclusions

The findings provide a complex portrait of current rural Pennsylvania school building conditions and projections for building use over the next 10 years.

Building Conditions

Building environmental conditions, such as air quality, air filtration systems, exhaust systems, heating systems, air conditioning and acoustics are important aspects of the day-to-day environment for student learning. While the majority of rural school respondents reported that the environmental conditions in their schools were satisfactory, a sizable minority reported that their environmental conditions were unsatisfactory.

The majority of respondents reported that the foundations, bricks, and walls in their schools were satisfactory. Roof conditions were rated lowest among these major building features.

More than 80 percent of respondents said building

safety features, such as fire alarms, smoke detectors, and emergency lighting, were satisfactory. And, while more than 60 percent said that building energy efficiency was satisfactory, more than 30 percent said it was unsatisfactory.

The majority of respondents reported that handicap accessibility, vehicular entrances and exits, pedestrian services, and bus loading areas were satisfactory. Student drop-off areas were rated lowest: one-third of schools reported that student drop-off areas were unsatisfactory.

Respondents' satisfaction ratings with building conditions showed some variation by the percentage of low-income students. Respondents from affluent schools were more satisfied with the drywall, plaster and bricks than those from less wealthy schools. Respondents from less wealthy schools (with 40 percent and above low-income students) were more likely to report their exterior water supply conditions as borderline than more wealthy schools.

Building Age

Rural school buildings, with an average age of 44 years, tended to be older than the national average age of rural schools (41 years). The average functional age of rural schools, defined as the number of years since the completion of major renovations, was 16 years. Fifteen percent of rural schools had a functional age of 35 years or more.

Rural schools' functional age did not show any variation by school characteristics, with regard to region and percentage of low-income students. The average functional age of secondary schools was younger than the average functional age of elementary schools (13 years versus 18 years).

The results showed that respondents from older schools typically reported worse school building conditions than those from newer schools. None of the respondents from schools aged 35 years or more said their environmental factors were in excellent condition. About 20 percent from schools with functional ages of 35 years or more reported their air filtration system and air conditioning as poor, and more than half from schools with functional ages of 35 years or more reported their roof as poor or borderline.

Older schools typically have worse building safety conditions and building energy efficiency features than newer schools. About 18 percent of respondents from schools with functional ages of 35 years or more reported their fire alarms, smoke detectors and sprinkler systems as poor and about 23 percent reported their emergency lighting as borderline. More than 80 percent of respondents from schools with functional ages of 35 years or

more reported their building energy efficiency condition as poor or borderline.

Respondents from schools with functional ages of 35 years or more were more likely to report their building accessibility as poor or borderline than those from schools aged 34 or less. About half of the respondents from older schools reported their handicapped accessibility, and vehicular entrances and exits as unsatisfactory and more than 70 percent said their student drop-off areas were poor or borderline.

Condition of Telecommunication in Rural School Buildings

The majority of rural schools were equipped with wired Internet access. More than 33 percent were equipped with both wired and wireless access. However, there was a gap between urban and rural schools in the condition of telecommunications. Rural schools had fewer computers with high speed connectivity-high capacity processors in classrooms and library/media centers than urban schools. There were fewer printers located in rural school classrooms and mobile computer labs than those in urban schools.

The technology equipment in rural schools also had some variations by school characteristics, such as the concentration of low-income students. More affluent rural schools (with less than 20 percent of low-income students) were more likely to have more digital cameras and digital video cameras in their classroom, more electronic whiteboards in their stationary computer labs, and more digital video cameras in their library/media centers than those in less wealthy schools.

Prediction of Enrollment Change

Over the next 10 years, rural school enrollment is projected to decrease 8 percent. The most significant decline is projected to be in western Pennsylvania, where rural school districts are projected to have a 16 percent decline in enrollment. Enrollment in elementary and secondary schools in western Pennsylvania is projected to decline about 13 percent and 17 percent, respectively.

About 30 percent of rural elementary schools and 48 percent of secondary schools are projected to experience significant enrollment decreases (15 percent or greater decrease). The proportion of rural elementary and secondary schools experiencing enrollment changes over the next 10 years will differ somewhat by geographic region and percentage of low-income students. More than 40 percent of elementary schools and more than 60 percent of secondary schools in the west are projected to experience significant enrollment decreases, while more than 30 percent of elementary schools and more than 20

percent of secondary schools in the east are projected to experience significant enrollment increases.

In addition, affluent elementary and secondary schools (those with less than 20 percent low-income students) are projected to be more likely to experience significant enrollment increases than less wealthy schools.

Policy Considerations

Based on the study findings, the researcher recommends the following policy considerations.

The Pennsylvania Department of Education and school districts should consider establishing a reporting system to effectively monitor school building conditions and conducting ongoing inventory assessments of statewide facilities.

To effectively monitor and enhance school facility conditions in rural Pennsylvania, PDE should consider creating a comprehensive set of minimum standards for facility conditions and conducting ongoing inventories of statewide facilities. By providing an inventory of existing conditions among rural schools in Pennsylvania, state government officials will have the details they need to make informed decisions about future educational needs.

At the local level, school districts should also consider evaluating and estimating their school building conditions regularly and release these evaluations to the public. Currently, the review of school building conditions is at the discretion of each district. Most districts include a section on buildings and grounds in their 5-year strategic plans, but they are not bound to complete anything in those plans. School districts are required to formally evaluate the conditions of their buildings if they seek reimbursement through PDE for any renovation or construction projects.

School districts should provide a clear estimate of their building construction or repair needs, along with a plan for raising the funds to meet those needs. The evaluation should provide information about building age, physical condition, telecommunications readiness, safety accessibility, and energy efficiency.

School districts should rethink under-used school buildings and maximize public use of school facilities.

As the survey results indicate, the majority of rural schools will experience severe under-enrollment over the next 10 years, with enrollment more than 25 percent below capacity. Elementary and secondary schools in the west and central regions are projected to be more likely than those in the east to be severely under-enrolled. Taking full advantage of school buildings with extra

space to meet today's educational program needs are important challenges for rural school districts.

School districts may need to consider consolidating schools. However, school districts could also take advantage of extra space in their buildings by offering community programs. School district officials and local communities could work together to look for ways to use the school facilities and creatively support or finance a variety of shared programs, such as adult education, job training, technology training, and health fitness centers.

PDE and school districts should consider the changing face of student learning environments to accurately assess building capacity needs.

Another issue that makes it important for school districts to prepare for future needs is the changing face of student learning environments. As the study results indicate, many rural schools appeared to be under-used. However, the current PDE formula for school capacity does not always account for the full range of programs that may be offered in rural schools. For example, federal regulations require a limited number of students with special education needs in the classroom. With current inclusion practices, special education students are mainstreamed back into the regular classroom. This situation not only requires the school administration to effectively use the classroom, but also challenges the current PDE school capacity formula, which did not consider this factor.

Also, current instructional methods encourage many "hands on" activities, which require more space in the classroom. Many old buildings in rural schools were originally designed for fixed rows of desks for whole class lectures and may not accommodate the new instructional methods of small-group, hands-on activities.

Technology improvements could also reduce the number of seats that may reasonably fit into a regular classroom. For example, current technology improvements require more computers in the classroom, which may also take more space than the traditional desk arrangement.

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