

# **IDENTIFYING DATA ELEMENTS TO SUPPORT WYOMING'S MONITORING OF COST PRESSURES**

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## *Identifying Data Elements to Support Wyoming's Monitoring of Cost Pressures*

At the conclusion of the joint September 16, 2011 meeting between Wyoming's Joint Appropriations Committee and Joint Education Committee, the Legislative Service Office was directed to work with its consultants to identify the current and additional data needed to effectively monitor cost pressures on the Wyoming Funding Model and its primary components.

The monitoring process is designed to utilize readily available state, regional, and national data as part of a set of relatively simple, understandable indicators of cost pressures. These monitoring indicators are not to be considered in isolation of one another nor, as individual indicators, are they intended to definitively signal a degradation of the Wyoming Funding Model's cost basis. However, if several indicators reflect deviations from "historical" ranges, as calculated by the state's consultants, the state may choose to invest in the collection and analysis of a deeper set of cost data to confirm the presence of cost pressures and, if confirmed, inform future legislative actions to address those cost pressures.

This brief provides an overview of the data to be analyzed in the monitoring framework, the sources of that data, and any potential improvements needed to the quality of data collected so as to provide clear, consistent information to the Legislature about Wyoming Funding Model cost pressures.

Section I identifies the data to be collected and analyzed to monitor cost pressures associated with the Teacher Labor Markets.

Section II identifies the data to be collected and analyzed to monitor cost pressures associated with the Non-Teacher Labor Markets.

Section III identifies the data to be collected and analyzed to monitor cost pressures associated with Energy and Educational Materials.

Section IV identifies the data to be collected and analyzed in an ongoing effort to understand teacher quality and teacher effectiveness in Wyoming as part of the monitoring of the teacher labor markets. The existing indicators for monitoring teacher labor market cost pressures would be combined with information about teacher quality and effectiveness to understand more specifically those cost pressures associated with recruiting and retaining the most effective teachers. Many of the data included in this section would be considered indirect measures of quality. Data already contained within the Wyoming Department of Education's (WDE) data warehouse would allow preliminary analysis of teacher effectiveness, but additional work is needed to solidify the connections between teacher and student data for consistent analysis and reporting. An appendix is included that provides a description of how teacher and student data can be linked for the purposes of analyzing teacher effectiveness.

In addition to the data identified in this brief, a primary resource to be included in the monitoring process is the Wyoming Department of Education's (WDE) annual *Continued Review of Educational Resources in Wyoming*. This report succinctly summarizes the resources generated and received by Wyoming's school districts and the ways in which districts are utilizing and allocating those resources. The WDE report provides information across all three areas to be monitored. A great deal of effort went into the development of

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this report and the continued refinement of the information reported has been a collaborative effort between the WDE and Wyoming's school districts.

As data previously collected and maintained by the Wyoming Professional Teaching Standards Board migrates to the WDE data warehouse and is included in the state's P-20 education information data system, special care and attention by both agencies will be needed to ensure data compatibility, integrity, accessibility, and usability, and to provide critical monitoring information to the Legislature. New, updated infrastructure and software solutions will be needed to make this system responsive to clients of the agencies (i.e., those seeking licensure or license renewal) and to ensure high-quality information is provided to the Legislature and other stakeholders.

Finally, the Legislature has invested a great deal of resources into developing one of the nation's more robust K-12 education information systems—Wyoming was in the first wave of states to satisfy the national Data Quality Campaign's 10 Essential Elements for state information systems. As the state's education information system continues to mature, consistent leadership and effort will be needed to take that information system to its greater potential. Critical next steps include greater integration of data elements across educational agencies and systems (early learning through K-12 through Wyoming's community colleges and the University of Wyoming) and integration of data with other state agencies such as the Wyoming Department of Workforce Services. This full-scale integration of data will provide the Legislature with a wide range of information by which to monitor its costs and the effectiveness and impact of the resources deployed. Moreover, the information gained from a robust K-12 education system integrated with preschool and higher education systems and other state agencies will provide great value to the Legislature in its monitoring, evaluation, and accountability efforts.

The Legislature's investments in both the hardware and software solutions to develop the education information system have been instrumental in moving Wyoming's K-12 data infrastructure forward. More critically, the Legislature's investments in high-quality data staff at WDE (and other agencies) have been paramount in creating this system and moving it forward to where it is today. The ability to recruit and retain high-quality technical and analytical staff to maintain and build upon the institutional knowledge will continue to be a great challenge not only to the WDE, but also to all state agencies. Ongoing cooperation of data and analytical staff within WDE and across agencies and systems is crucial to ensuring high-quality, meaningful information is available to the educators across the state and policymakers in the Legislature.

**SECTION I. Monitoring Data on Teacher Labor Markets**

<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Changes in relative wages of teachers in Wyoming to wages of other professional and technical occupations [Stoddard Indicator #1]	Bureau of Labor Statistics, Occupational Employment Statistics survey.  Available annually in summer.	None needed.
Changes in state-level average teaching wages in Wyoming and other states [Stoddard Indicator #2]	National Center for Education Statistics, <i>Digest of Education Statistics</i> and National Education Association, <i>NEA Rankings &amp; Estimates</i> .  Available annually each spring.	None needed.
Trend in K-12 Student Enrollment [Stoddard Indicator #3]	National Center for Education Statistics, <i>Digest of Education Statistics</i> .  Available annually.	None needed.
Trend in Teacher Retirement [Stoddard Indicator #4]	Stoddard analysis of WY Department of Education Staffing Files (WDE 602 and WDE 652).  Available annually.	None needed.
Trend in Fraction New Hires [Stoddard Indicator #5]	Stoddard analysis of WY Department of Education Staffing Files (WDE 602 and WDE 652).  Available annually.	None needed.
Trend in Teacher Exits, Teachers with 0-3 years of experience and 4-20 years of experience [Stoddard Indicator #6]	Stoddard analysis of WY Department of Education Staffing Files (WDE 602 and WDE 652).  Available annually.	None needed.

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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
<p>Number of applicants per full-time teaching position [Stoddard Indicator #7]</p>	<p>WY Department of Education district vacancy survey (WDE 633).  Available annually.</p>	<p>Additional support to districts is needed to ensure that district responses are consistent.</p> <p>The main future improvement should be to the questions about the number of applicants per position. Some districts appear to have a separate application for each open position, while others appear to have a pool of applicants and hire several teachers from that same pool. Survey instrument could be improved to allow districts the option to answer question in both ways.</p> <p>For example, survey questions could be along the lines of the following:</p> <ul style="list-style-type: none"> <li>--How many applicants applied for this open position?</li> <li>--Were other positions filled using this same pool of applicants?</li> <li>--How many positions total (including this one) were filled out of this same pool of applicants?</li> </ul> <p>These changes have been communicated to the WDE and are anticipated in the 2011-12 collection.</p>
<p>Reasons for open positions (New position, teacher transferred, teacher left profession, retired, terminated.)</p>	<p>WY Department of Education district vacancy survey (WDE 633).  Available annually.</p>	<p>This data could be improved by dividing the category of "Transferred (out of district)" into "Transferred (out of district, in state)" and "Transferred (out of districts, out of state)".</p>

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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Percent districts hiring first choice [Stoddard Indicator #8]	WY Department of Education district vacancy survey (WDE 633).  Available annually.	None needed.
Percent districts reporting “Somewhat easy” or “Easy” to hire [Stoddard #9]	WY Department of Education district vacancy survey (WDE 633).  Available annually.	This data could be improved by having the survey instrument refer to each individual position separately and not to all positions. Question currently reads “How would you rate the overall ability to attract high quality applicants when vacancies arise in the district?”  Instead, question could read “How would you rate the ability of the district to attract high quality applicants for this position?”
Hay Group: Certified Practicing Teachers Pay and Benefits Study	Compared salary schedules and benefits from sample districts in other states.  Availability on request.	None needed.
Comparative Wage Index, college graduates	Taylor/LSO analysis  Available annually.	None needed.
Number of New and Renewed Teaching Licenses in Wyoming; Number of graduates by field from University of Wyoming	WY Professional Teaching Standards Board.  U.S. Department of Education Integrated Postsecondary Education Data System (IPEDS) graduate and degree data.  Available annually.	If PTSB provided license data by field, this would allow the state to monitor potentially lower supply in specific subject areas (e.g., math and science, foreign languages).  New licensure data could potentially be decomposed into applicants in other states and from new graduates in Wyoming.

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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Areas of Teacher Shortage or Out-of-Field Teaching	WY Department of Education and WY Professional Teaching Standards Board; U.S. Department of Education <i>Teacher Shortage Areas</i>	To be considered with the above data on the number of new and renewed teaching licenses.

**SECTION II. Monitoring Data on Non-Teacher Labor Market**

<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Relative wages of nonteaching staff employed in K-12 public schools to wages in similar occupational groups for a non-school employer	Occupational Employment Statistics survey.  Available annually  Wages for K-12 school employees, non-school employees, and all non-public employees require Department of Workforce Services reports specifically prepared for this analysis.	None needed.
Exit rates of nonteaching staff	Department of Education Staffing Files (WDE 602 and WDE 652).	None needed.
Exit rates for comparable occupations for all Wyoming employees	Department of Workforce Services reports. Availability is subject to frequency of Department of Workforce Services analysis.	None needed.



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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Hay Group: Analysis of School District Salaries (Non-Teaching positions)	<p>Education Research Service (ERS) salary survey for Rocky Mountain school districts (states of CO, ID, UT, MT, ND, SD, NE) – match with NCES locale codes similar to Wyoming school districts</p> <p>A comparison is also made to the State of WY Executives and General Pay Plans</p> <p>ERS survey available annually at cost of approximately \$5,000.</p> <p>State Market Policy Positions calculated by Hay Group every three years.</p>	None needed.
Comparative Wage Index, college graduates	<p>Taylor/LSO analysis</p> <p>Available annually on request.</p>	None needed.
Taylor Comparative Wage Index, high school graduates	<p>Taylor/LSO analysis</p> <p>Available annually on request.</p>	None needed.

**SECTION III. Monitoring Data for Energy and Educational Materials**

<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Cost Index, Energy	Weighted average of Bureau of Labor Statistics Producer Price Index for Commercial Natural Gas (Series ID PCU221210221210113) with weight of 55.1% and Electric Power (Series ID PCU22112222112242) with weight of 44.9%.  Available monthly.	None needed.
Cost Index, Educational Materials	Bureau of Labor Statistics Producer Price Index for Office Materials and Supplies (Series ID WPU091506).  Available monthly.	None needed.

**SECTION IV. Monitoring Data for Teacher Quality & Effectiveness**

<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Grade Point Average of new hires	Professional Teaching Standards Board and Wyoming Department of Education.  Annual basis for new hires.	Older cohorts of teachers contain more missing data.
Average ACT scores of all undergraduates attending the same college/university of new hires	PTSB reports undergraduate institution of teachers.  Available on annual basis for new hires.  National Center for Education Statistics survey Integrated Postsecondary Education Data System (IPEDS) reports average ACT scores for all universities in the US.  Available annually.	Older cohorts of teachers contain more missing data.
ACT/SAT scores of those certified in State of Wyoming	Collected directly from ACT and College Board.  Must be requested directly from testing agencies.	Not currently available from either WY Professional Teaching Standards Board or WY Department of Education.  This data element is a proxy measure of teacher quality ultimately to be replaced by more direct measures of teacher effectiveness.

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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
PRAXIS scores of those certified in State of Wyoming	WY Professional Teaching Standards Board & WY Department of Education; Educational Testing Service (ETS).  Must be requested directly from ETS.	Scores are only required for limited subject areas in the state. Requesting all scores for all certified individuals must be made through ETS.  This data element is a proxy measure of teacher quality ultimately to be replaced by more direct measures of teacher effectiveness.
Percent Teachers with MA degree or higher; Field of Study for MA	Wyoming Department of Education Staffing Files (WDE 602 and WDE 652); Professional Teaching Standards Board.  Annual basis.	Older cohorts of teachers contain more missing data.  Note that this measure is not strongly linked to student outcomes in existing research.
Percent teachers with National Board Certification	Wyoming Department of Education collection (WDE 112) with recorded salary supplements collected in staffing files (WDE 602 and WDE 652).  Annual basis.	Note that this measure is not strongly linked to student outcomes in existing research.  These data need to be collected in a more systematic way that records subject area of certification and, into the future, certification renewals.
Percentage of teachers with less than 3 years of experience	Department of Education Staffing Files.  Annual basis.	None needed.
Average ACT score, GPA, number of remedial courses for Department of Education majors at University of Wyoming, and majors in other fields	University of Wyoming.  Available on request.	None needed.

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<b>Metric</b>	<b>Data Source</b>	<b>Potential Improvements to Data Quality</b>
Average ACT score, GPA, number of remedial courses for Department of Education majors at universities and colleges supplying teachers to Wyoming, and majors in other fields	Colleges and universities such as Montana State University, Bozeman who supply teachers to Wyoming.  Available on request and subject to approval of the colleges and universities.	None needed.

**APPENDIX A: Teacher-to-Student Linkages to Analyze Teacher Effectiveness**

As noted, the metrics in Section IV of this brief are only proxies for teacher quality. The WDE data warehouse and education information system allows for connections between teacher and student data and could be used to analyze teacher effectiveness, but needs to be strengthened through greater data quality measures (e.g., establishing formal teacher-of-record; common course naming) to ensure consistent linkages, analysis, and reporting. In our view, an ideal data system would allow for future flexibility in terms of specific measures to be generated, but would be established based on the following general framework.

1. Data linking students with their subject area classes and teachers in those courses

This system would be flexible enough to accommodate high school, middle school, and elementary school students, without the need to designate a unique “teacher of record.” A system that linked students based on teacher ids and periods would also allow for future work looking at the effects of peer groups on student performance.

For example, a data record could look like the following for 2 high school students and an elementary school student:

Student ID	Period 1 Teacher ID	Period 1 Course ID	Period 2 Teacher ID	Period 2 Course ID
AAAAAA	2222222	MAT	3333333	ENG
BBBBBB	2222222	MAT	4444444	MUS
CCCCCC	5555555	ELO	5555555	ELO

2. The teacher ID in this system should be the same as that used by the WDE in Staffing Files.
3. Student IDs should be consistent and should enable student records to be linked over time. This would ensure that the student ID number remains consistent for students who move across schools or districts.
4. Student records should also include their school id number.
5. Demographic information for student should be linked to their record. Ideally, this would include date of birth, gender, race, and special education status. Many data systems like this also include the student’s original date of enrollment in the school or a measure of mobility into school (for example, spring enrollment in school and fall enrollment in the school).
6. Raw test scores—formative, benchmark and summative assessments—for individual subject areas should be linked to student records.

This data system would enable the state to calculate a wide range of metrics of teacher effectiveness and to track student progress over time.

For example, the state could track student performance for cohorts of teachers with the same level of experience (e.g., new teachers) over time. Additionally, the state could

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monitor whether the most effective teachers are being retained in teaching, with less effective teachers leaving, or if instead the best teachers are the most likely to exit the state or the profession.